

Explaining smart metered daily total energy demand in residential buildings using linked socio-technical data

Supplementary data

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Appendix A – regression variables

Table 1. Variables included in basic data.

Description	Variable name	Categories	Notes
Region	<i>Region</i>	South East, Greater London, South West, East of England, East Midlands, West Midlands, North West, Wales, Yorkshire, North East	
IMD quintile	<i>IMD_quintile</i>	1, 2, 3, 4, 5	
Day of week	<i>dayofweek</i>	Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday	
Bank holiday	<i>bank_holiday</i>	Yes, No	
Heating degree days to a base of 15.5C	<i>Hdd_c</i>	Continuous variable	Centrised
Daily sum of surface solar radiation	<i>solar_radiation_c</i>	Continuous variable	Centrised.

Table 2. Variables included in the SERL survey data.

Associated survey question number	Description	Variable name	Categories	Notes
A2	Having a smart meter affected the way you use gas or electricity?	C(A2)	Don't know or not applicable, not at all, a little, some, a lot	
A3	Central heating fuel type	C(central_heating_serl)	Gas, electric	
A4	Central heating controlled by timer	C(A4_timer)	Yes, no	
A4	Central heating controlled by temperature	C(A4_temp)	Yes, no	

A4	Central heating controlled by smart device	C(A4_smart)	Yes, no	
A4	Central heating controlled manually	C(A4_manual)	Yes, no	
A5	Thermostat set point *	A5_setpoint	≤ 19.0°C, >19.0°C and ≤20.0°C, >20.0°C and ≤ 22.0°C, > 22.0°C, not applicable	
A6, A7	Any standalone heaters which are mains powered?	C(A6_7_mains)	1, 0	
A8	In very cold winter weather how often are any standalone heaters used?	C(A8_use_own)	None or don't know, rarely or never, varies, daily or most days	
A9	Do you adjust your heating – when especially cold	C(A9_cold)	Yes, no	
A9	Do you adjust your heating – because of children, infants, babies	C(A9_children)	Yes, no	
A9	Do you adjust your heating – visitors	C(A9_visitors)	Yes, no	
A9	Do you adjust your heating – pets	C(A9_pets)	Yes, no	
A9	Do you adjust your heating – illness	C(A9_illness)	Yes, no	
A9	Do you adjust your heating – working from home	C(A9_wfh)	Yes, no	
A9	Do you adjust your heating – none of the above reasons	C(A9_none)	Yes, no	
A10	How often do you adjust the heating controls when the house is unoccupied	C(A10_how_often)	Never, not very often, quite often, very often, always, not applicable cannot do this	
A11	During the winter are there living spaces not usually heated	C(A11)	Yes, no	

A12	Tap water heated by which fuel	hot_water_taps	Gas, electricity or both, neither	
A12	Shower water heated by which fuel	hot_water_shower	Gas, electricity, neither, both, don't know	
A13	How often do you – switch off lights	A13_often_lights	Always, very often, quite often or not very often or not applicable or never	
A13	How often do you – put on more clothes when it is cold	A13_often_clothes	Always, very often, quite often, not very often, never or not applicable	
A14	How much effort does your household make to limit energy use	A14	No effort at all or don't know, a little effort, some effort, a great deal of effort	
A15	How often will your household open windows on a typical cold day	A15_cold	Never, not very often, quite often, very often, always	
A15	How often will your household open windows on a typical warm day	A15_warm	Never or not very often, quite often, very often, always	
A16	Considering replacing or adding to your heating or energy supply in the next 12	A16_no	Yes, no	

	months – not considering changes			
A16	Considering replacing or adding to your heating or energy supply in the next 12 months – not applicable	A16_na	Yes, no	
A16	Considering replacing or adding to your heating or energy supply in the next 12 months – gas boiler	A16_gas_boiler	Yes, no	
A16	Considering replacing or adding to your heating or energy supply in the next 12 months – solar panels for electricity	A16_pv	Yes, no	
A16	Considering replacing or adding to your heating or energy supply in the next 12 months – wood or fuel burner	A16_wood_burner	Yes, no	
B1	What type of accommodation do you live in? *	B1	Detached, semi-detached, terraced, purpose-built flat, converted house or terraced building	
B4	Do you own or rent this accommodation?	B4	Own or part-own, private rental, social rental or rent free	
B5	Number of rooms	total_rooms_serl_c	Continuous variable	Centrised
B6	Number of bedrooms	bedrooms_c	Continuous variable	Centrised
B7	During the cold winter weather can you keep comfortably warm?	B7_keepwarm	Yes, no or don't know	
B8	Do you have problems with condensation, damp or mould?	B8_damp	Yes, no or don't know	

B9	When was your accommodation built? *	B9	Before 1900, 1900 to 1929, 1930 to 1949, 1950 to 1975, 1976 to 1990, 1991 to 2002, 2003 onwards, don't know	
B10	Appliances in accommodation – electric oven	B10_elec_oven	Yes, no	
B10	Appliances in accommodation – gas oven	B10_gas_oven	Yes, no	
B10	Appliances in accommodation – electric hob	B10_elec_hob	Yes, no	
B10	Appliances in accommodation – gas hob	B10_gas_hob	Yes, no	
B10	Appliances in accommodation – dishwasher	B10_dish	Yes, no	
B10	Appliances in accommodation – fridge or fridge freezer	B10_fridge	Yes, no	
B10	Appliances in accommodation – standalone freezer	B10_freezer	Yes, no	
B10	Appliances in accommodation – combined clothes washer dryer	B10_combined_wash	Yes, no	
B10	Appliances in accommodation – washing machine	B10_washing	Yes, no	
B10	Appliances in accommodation – tumble dryer	B10_dryer	Yes, no	
B10	Appliances in accommodation – laptop or computer	B10_laptop	Yes, no	
B10	Appliances in accommodation – television	B10_tv	Yes, no	
B10	Appliances in accommodation – air conditioning unit	B10_acu	Yes, no	
B10	Appliances in accommodation – cooling fan	B10_fan	Yes, no	

C2	Total number of adult occupants (≥ 16 years old)	occupants_adult_c	Continuous variable	Centrised
C2	Total number of children (< 16 years old)	occupants_0_15_c	Continuous variable	Centrised
C3	Proportion of people over 16 – working (paid or unpaid) more than 30 hours a week	working_30hr_plus_c	0, 1, 2, 3 or more	Centrised
C3	Proportion of people over 16 – working (paid or unpaid) less than 30 hours a week	working_30hr_less_c	0, 1 or more	Centrised
C4	Proportion of people with a degree or higher qualification	education_c	0, 1, 2, 3 or more	Centrised
D4	How would you say you are managing financially these days?	D4	Prefer not to say or finding it very difficult, finding it quite difficult, just about getting by, doing alright, living comfortably	
n/a	Survey collection method	Collection_method	Online, postal	

Table 3. Variables included in the EPC data. See epc.opendatacommunities.org/ for description of variables.

Description	Variable name	Categories	Notes
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Secondary heating description	secondheatDescription	None Room heaters, mains gas Room heaters, electric Room heaters, solid fuel Room heaters, wood logs Portable electric/assumed	
Total floor area*	Total_floor_area_c	Continuous variable	Centrised
Current energy consumption	currentEnergyConsumption_c	Continuous variable	Centrised
Number of heated rooms*	numberHeatedRooms_c	Continuous variable	Centrised
Current energy efficiency *	negativeCurrentEnergyEfficiency_c	Continuous variable	Centrised. Transformed variable: negativeCurrentEnergyEfficiency = 100 - currentEnergyEfficiency
Glazed area	glazedArea	Normal or less than typical, more than typical or much more than typical	
Number of extensions	extensionCount_c	Continuous variable	Centrised
Low energy lighting	lowEnergyLighting_c	Continuous variable	Centrised
Number of open fireplaces	numberOpenFireplaces_c	Continuous variable	Centrised

Hot water energy efficiency	hotWaterEnergyEff	Very good, good, average, poor, very poor	
Lighting energy efficiency	lightingEnergyEff	Very good, good, average, poor, very poor	
Main fuel	mainFuel	Gas, electricity	
EPC age (number of days since EPC produced)	epcAge_c	Continuous variable	Centrised
Tenure	tenure	Owner occupied, rental (private), rental (social) or other	
Construction age band ⁺	constructionAgeBand	Before 1900, 1900 to 1929, 1930 to 1949, 1950 to 1966, 1967 to 1975, 1976 to 1982, 1983 to 1990, 1991 to 1995, 1996 to 2002, 2003 to 2006 or 2007 onwards.	

Windows energy efficiency ⁺	windowsEnergyEff	Very good or good, average, poor, very poor	
Walls energy efficiency ⁺	wallsEnergyEff	Very good or good, average, poor, very poor	
Roof energy efficiency ⁺	roofEnergyEff	Very good, good, average, poor, very poor, N/A or missing	
Main heating energy efficiency ⁺	mainheatEnergyEff	Very good, good, average, poor, very poor	
Main heating controls energy efficiency ⁺	mainheatcEnergyEff	Very good or good, average, poor, very poor	

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Appendix B – cross-validation test statistics

Model	All data	Basic plus SERL survey	Basic plus SERL survey	Basic plus EPC	Basic data only	Basic data only	Basic data only	All data	Basic plus SERL survey	Basic plus SERL survey	Basic plus EPC	Basic data only	Basic data only
CV type	level 1	level 1	level 1	level 1	level 1	level 1	level 1	level 2	level 2	level 2	level 2	level 2	level 2
Sample	All data after merge	All data after merge	Basic plus SERL survey after merge	All data after merge	All data after merge	Basic plus SERL survey after merge	All data after merge	All data after merge	Basic plus SERL survey after merge	All data after merge	All data after merge	All data after merge	Basic plus SERL survey after merge
RMSE mean (training)	23.03	24.68	26.49	25.43	33.89	34.19	22.61	24.37	26.35	25.26	33.82	34.16	
RMSE lower (training)	0.27	0.27	0.14	0.26	0.21	0.13	0.65	0.73	0.28	0.60	0.80	0.33	
RMSE upper (training)	0.15	0.16	0.05	0.15	0.15	0.04	0.60	0.67	0.35	0.51	0.73	0.50	
RMSE mean (testing)	23.06	24.70	26.50	25.44	33.89	34.19	27.51	27.59	28.27	27.15	34.37	34.50	
RMSE lower (testing)	0.57	0.63	0.21	0.61	0.62	0.16	2.33	2.58	1.58	2.51	3.00	1.93	
RMSE upper (testing)	1.02	1.00	0.53	0.99	0.83	0.50	2.91	3.03	1.61	2.85	3.31	1.23	
R2 mean (training)	0.87	0.85	0.84	0.84	0.71	0.73	0.87	0.85	0.84	0.84	0.71	0.73	
R2 lower (training)	0.001	0.002	0.001	0.001	0.002	0.001	0.007	0.008	0.004	0.006	0.009	0.003	
R2 upper (training)	0.003	0.003	0.001	0.003	0.002	0.001	0.006	0.007	0.004	0.006	0.009	0.004	
R2 mean (testing)	0.87	0.85	0.84	0.84	0.71	0.73	0.81	0.81	0.81	0.81	0.70	0.72	
R2 lower (testing)	0.009	0.010	0.005	0.010	0.009	0.005	0.032	0.033	0.023	0.030	0.047	0.015	
R2 upper (testing)	0.005	0.006	0.003	0.006	0.007	0.003	0.032	0.036	0.018	0.034	0.040	0.011	

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adj. R2 mean (training)	0.72	0.76	0.80	0.79	0.69	0.72	0.63	0.73	0.79	0.78	0.69	0.72
adj. R2 lower (training)	0.003	0.002	0.001	0.002	0.002	0.001	0.019	0.015	0.004	0.009	0.010	0.003
adj. R2 upper (training)	0.005	0.004	0.001	0.003	0.002	0.001	0.011	0.011	0.005	0.007	0.009	0.004
No. parameter s	356	244	250	156	42	44	356	244	250	156	42	44

Table 4. Summary of cross-validation test statistics. Level 1 cross-validation refers to within-group prediction, while level 2 refers to between-group.

Appendix C – full regression results

Model with basic data only

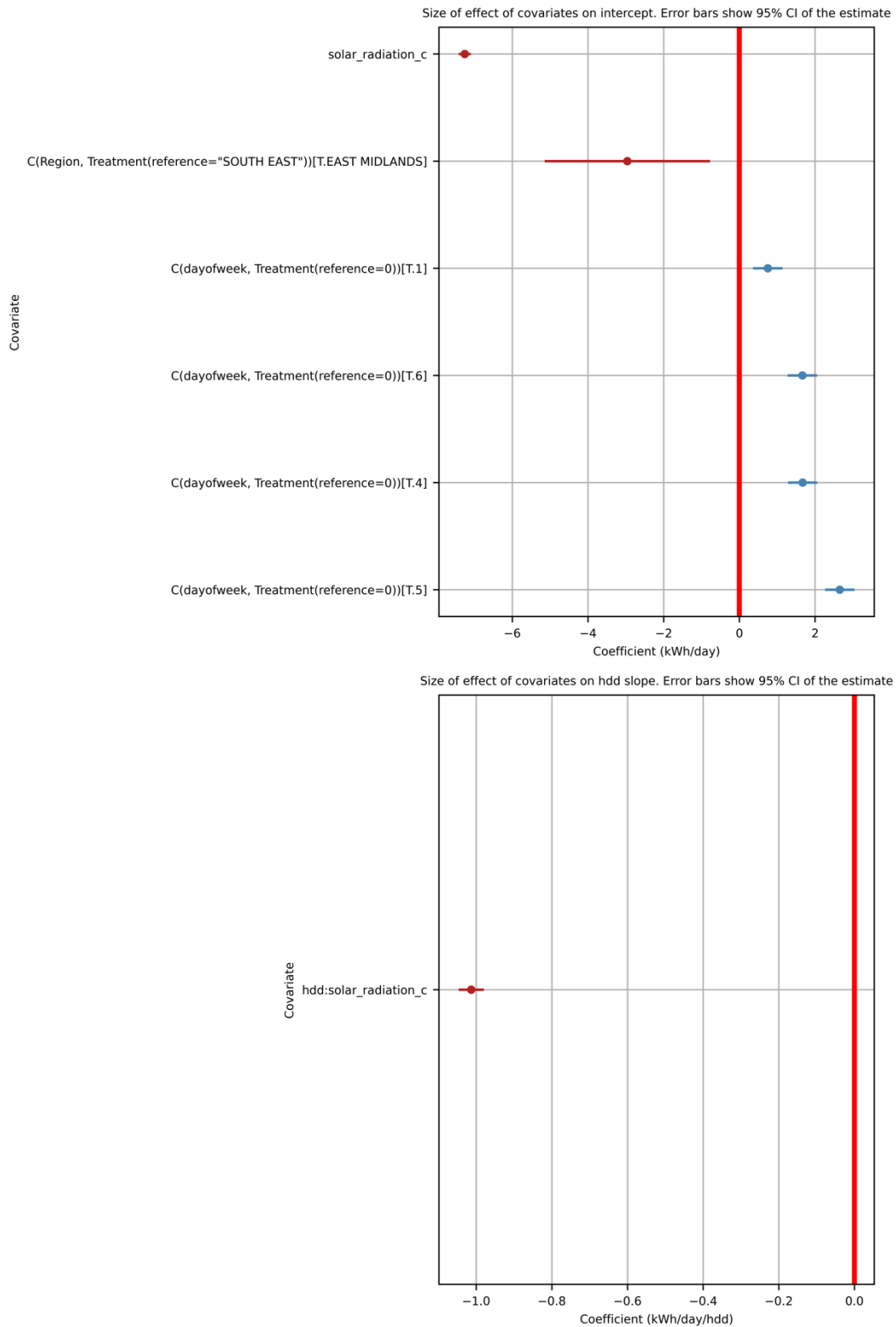


Figure A 1. Size of coefficients for statistically significant ($p < 0.05$) and low VIF (< 5) variables for the Basic data only model and larger sample ($N=1418$), showing the variables with up to the ten largest positive and negative effects on intercept (upper) and hdd slope (lower). Those with negative effect are shown in red, those with positive effect shown in blue. Error bars show 95% confidence interval of the estimate.

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Variable	Description	Coefficient	Standard error	z-score	p-value	95% CI (lower)	95% CI (upper)	VIF
Intercept		19.19	0.88	21.87	0.00	17.47	20.91	
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-2.96	1.11	-2.66	0.01	-5.15	-0.78	4.47
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	-0.78	1.08	-0.72	0.47	-2.89	1.33	4.07
C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	1.79	1.00	1.80	0.07	-0.16	3.75	4.62
C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-0.78	1.22	-0.64	0.52	-3.16	1.61	6.16
C(Region, Treatment(reference="SOUTH EAST"))[T.SCOTLAND]	Scotland vs South East	0.36	1.48	0.24	0.81	-2.54	3.25	6.61
C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	-1.63	1.07	-1.52	0.13	-3.74	0.48	4.10
C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-1.84	1.33	-1.38	0.17	-4.45	0.77	3.80
C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-1.84	1.14	-1.62	0.11	-4.06	0.39	4.51
C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	-3.75	1.46	-2.56	0.01	-6.62	-0.88	7.13
C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	-2.81	1.00	-2.82	0.01	-4.76	-0.86	5.21
C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	-1.02	0.91	-1.13	0.26	-2.80	0.75	5.35
C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	-0.11	0.87	-0.12	0.90	-1.81	1.60	5.53
C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	1.95	0.87	2.25	0.02	0.25	3.65	5.47
C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	0.75	0.20	3.77	0.00	0.36	1.14	4.83
C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	-0.60	0.20	-2.95	0.00	-0.99	-0.20	5.05
C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	2.04	0.20	10.19	0.00	1.65	2.44	5.07

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C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	1.67	0.20	8.48	0.00	1.29	2.06	4.81
C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	2.65	0.20	13.39	0.00	2.26	3.04	4.92
C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	1.66	0.20	8.33	0.00	1.27	2.05	4.85
C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	6.46	0.73	8.83	0.00	5.03	7.89	9.71
hdd		4.74	0.28	16.70	0.00	4.18	5.30	17.18
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]		-0.48	0.36	-1.32	0.19	-1.19	0.23	5.05
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]		-0.47	0.35	-1.34	0.18	-1.16	0.22	4.39
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]		0.69	0.33	2.13	0.03	0.06	1.33	5.20
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]		0.10	0.39	0.25	0.80	-0.67	0.87	6.73
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.SCOTLAND]		-0.79	0.47	-1.68	0.09	-1.71	0.13	7.18
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]		-0.04	0.35	-0.12	0.90	-0.73	0.65	4.23
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]		-0.20	0.44	-0.46	0.65	-1.06	0.66	3.95
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]		0.49	0.37	1.31	0.19	-0.24	1.22	5.08
hdd:C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]		0.10	0.47	0.22	0.83	-0.81	1.02	7.58
hdd:C(IMD_quintile, Treatment(reference=3))[T.1]		-1.16	0.32	-3.59	0.00	-1.79	-0.52	5.61
hdd:C(IMD_quintile, Treatment(reference=3))[T.2]		-0.83	0.29	-2.82	0.01	-1.41	-0.25	5.73
hdd:C(IMD_quintile, Treatment(reference=3))[T.4]		0.49	0.28	1.73	0.08	-0.07	1.05	5.84
hdd:C(IMD_quintile, Treatment(reference=3))[T.5]		1.63	0.28	5.75	0.00	1.07	2.18	5.85
hdd:C(dayofweek, Treatment(reference=0))[T.1]		-0.07	0.03	-2.40	0.02	-0.12	-0.01	5.38
hdd:C(dayofweek, Treatment(reference=0))[T.2]		0.04	0.03	1.56	0.12	-0.01	0.10	5.78
hdd:C(dayofweek, Treatment(reference=0))[T.3]		-0.25	0.03	-8.57	0.00	-0.30	-0.19	5.51
hdd:C(dayofweek, Treatment(reference=0))[T.4]		-0.08	0.03	-2.72	0.01	-0.13	-0.02	5.10

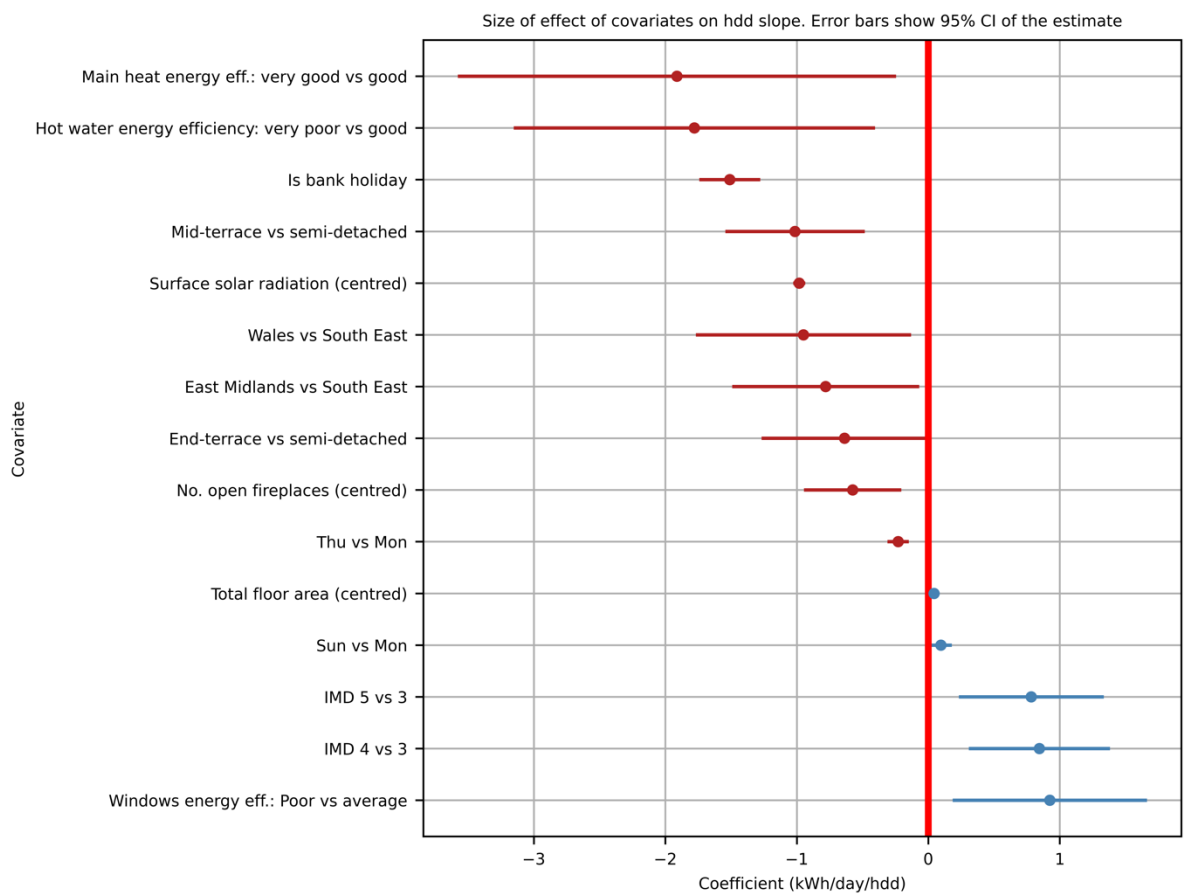
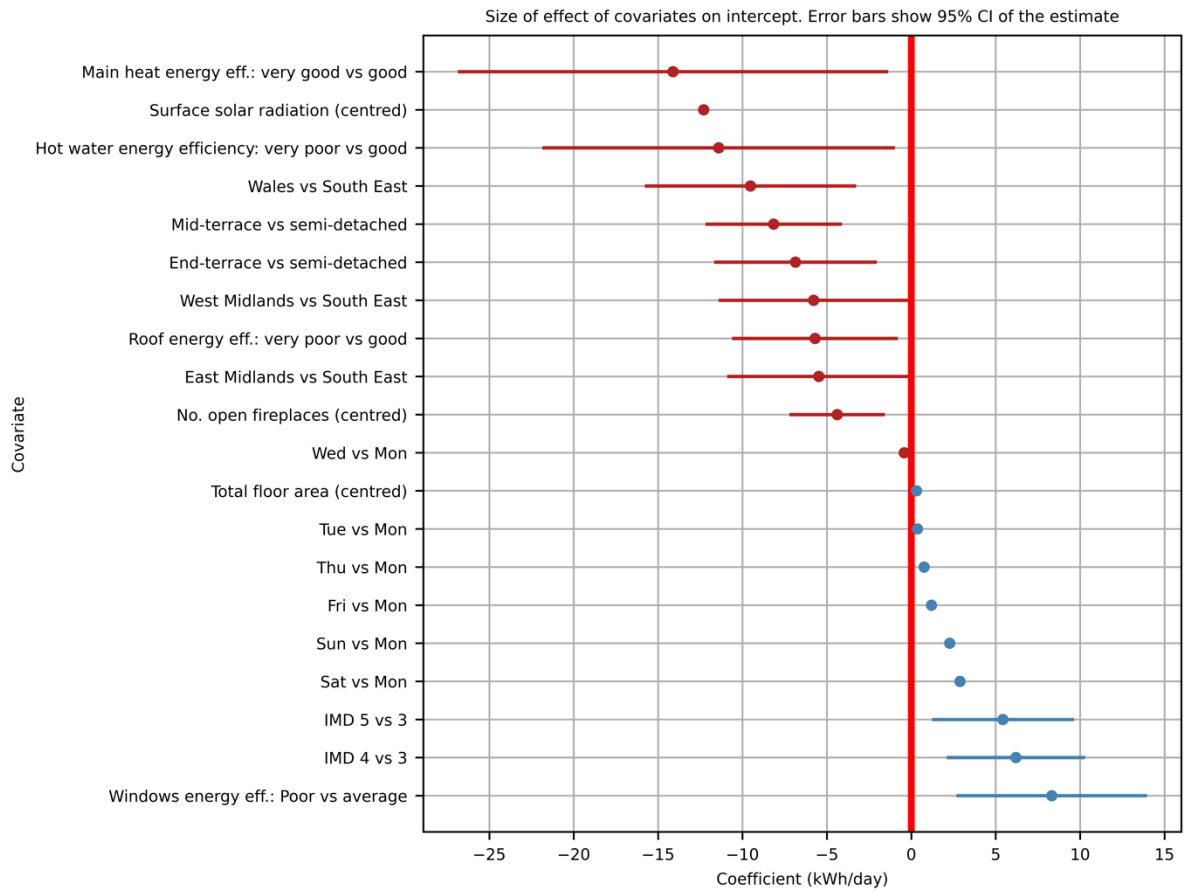
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hdd:C(dayofweek, Treatment(reference=0))[T.5]		0.05	0.03	1.54	0.12	-0.01	0.10	5.10
hdd:C(dayofweek, Treatment(reference=0))[T.6]		0.11	0.03	3.69	0.00	0.05	0.17	5.10
hdd:C(bank_holiday, Treatment(reference=0))[T.1]		-1.30	0.08	-15.78	0.00	-1.46	-1.14	9.90
solar_radiation_c	Surface solar radiation (centred)	-7.26	0.08	-90.57	0.00	-7.42	-7.10	3.29
hdd:solar_radiation_c		-1.01	0.02	-61.17	0.00	-1.05	-0.98	4.17
Group Var		109.06	0.25					
Group x hdd Cov		16.48	0.06					
hdd Var		12.13	0.03					

Table A 1. Regression results using linear mixed effects model with random intercept and hdd slope using basic data only and larger sample (N=1418). Dependent variable total energy consumption per day (kWh/day). Number of observations: 372529. Number of groups: 1418. Min. group size: 45. Max. group size: 560. Mean group size: 262.7.

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Model with basic plus EPC data



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Figure A 2. Size of coefficients for statistically significant ($p < 0.05$) and low VIF (< 5) variables for the Basic plus EPC data model and smaller sample ($N = 682$), showing the variables with up to the ten largest positive and negative effects on intercept (upper) and hdd slope (lower). Those with negative effect are shown in red, those with positive effect shown in blue. Error bars show 95% confidence interval of the estimate.

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Variable	Description	Coefficient	Standard error	z-score	p-value	95% CI (lower)	95% CI (upper)	VIF
Intercept		51.93	5.32	9.76	0.00	41.51	62.35	
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-5.49	2.77	-1.98	0.05	-10.92	-0.06	1.77
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	-1.98	2.59	-0.76	0.45	-7.06	3.10	1.79
C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	1.36	2.53	0.54	0.59	-3.61	6.33	2.45
C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-4.40	3.06	-1.44	0.15	-10.40	1.60	1.64
C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	0.65	2.58	0.25	0.80	-4.40	5.70	2.05
C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-9.53	3.19	-2.99	0.00	-15.79	-3.28	1.71
C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-5.80	2.86	-2.02	0.04	-11.41	-0.18	1.78
C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	-2.53	3.44	-0.74	0.46	-9.27	4.21	1.84
C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	2.12	2.36	0.90	0.37	-2.51	6.75	1.80
C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	1.21	2.15	0.56	0.57	-3.01	5.43	1.91
C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	6.20	2.09	2.96	0.00	2.09	10.30	2.32
C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	5.42	2.15	2.53	0.01	1.22	9.63	2.38
C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	0.36	0.16	2.25	0.02	0.05	0.67	1.92
C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	-0.43	0.16	-2.66	0.01	-0.74	-0.11	1.95
C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	0.75	0.16	4.74	0.00	0.44	1.06	1.93
C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	1.19	0.16	7.52	0.00	0.88	1.50	1.93
C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	2.88	0.16	18.16	0.00	2.57	3.19	1.94
C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	2.28	0.16	14.30	0.00	1.97	2.59	1.91

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C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-0.85	0.47	-1.79	0.07	-1.78	0.08	1.98
C(secondheatDescription, Treatment(reference="None"))[T.Portable electric/assumed]	Has Portable electric/assumed	1.20	5.24	0.23	0.82	-9.08	11.47	1.43
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, electric]	Has Room heaters, electric	-1.72	2.20	-0.78	0.44	-6.04	2.60	1.70
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, mains gas]	Has Room heaters, mains gas	-1.93	1.92	-1.01	0.31	-5.68	1.83	2.51
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, solid fuel]	Has Room heaters, solid fuel	-1.18	3.67	-0.32	0.75	-8.38	6.02	1.49
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, wood logs]	Has Room heaters, wood logs	-5.06	4.19	-1.21	0.23	-13.27	3.15	1.34
C(glazedArea, Treatment(reference="Normal or less than typical"))[T.More than typical or much more than typical]	Glazed area: More than typical or much more than typical vs Normal or less than typical	-2.01	3.74	-0.54	0.59	-9.33	5.31	1.15
C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Average]	Hot water energy efficiency: average vs good	-0.14	2.28	-0.06	0.95	-4.60	4.32	1.78
C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Poor]	Hot water energy efficiency: poor vs good	-6.62	3.99	-1.66	0.10	-14.45	1.20	1.77
C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Good]	Hot water energy efficiency: very good vs good	8.69	5.78	1.50	0.13	-2.64	20.02	3.42
C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Hot water energy efficiency: very poor vs good	-11.42	5.33	-2.14	0.03	-21.87	-0.97	2.08
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Average]	Lighting energy efficiency: average vs very good	-5.96	5.51	-1.08	0.28	-16.76	4.84	7.65
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Good]	Lighting energy efficiency: good vs very good	0.50	3.61	0.14	0.89	-6.58	7.59	3.61
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Poor]	Lighting energy efficiency: Poor vs very good	-3.37	7.16	-0.47	0.64	-17.41	10.68	7.54
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Very Poor]	Lighting energy efficiency: very poor vs very good	-3.99	8.52	-0.47	0.64	-20.69	12.71	14.9

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C(tenure, Treatment(reference="owner-occupied"))[T.rental (private)]	Private rental vs owner/part-owner	3.61	2.15	1.68	0.09	-0.61	7.83	1.49
C(tenure, Treatment(reference="owner-occupied"))[T.rental (social) / Other]	Social rental / other vs owner/part-owner	-0.24	2.88	-0.08	0.93	-5.88	5.40	1.58
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.2003-2006 / 2007 onwards]	Build date: 2003-2006/2007 vs 1950-1966	-6.42	3.96	-1.62	0.11	-14.18	1.34	2.19
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1900-1929]	Build date: 1900-1929 vs 1950-1966	4.16	3.08	1.35	0.18	-1.88	10.20	3.46
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1930-1949]	Build date: 1930-1949 vs 1950-1966	2.23	2.61	0.85	0.39	-2.89	7.35	2.43
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1967-1975]	Build date: 1967-1975 vs 1950-1966	-3.38	2.59	-1.30	0.19	-8.46	1.71	1.84
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1976-1982]	Build date: 1976-1982 vs 1950-1966	-6.13	3.46	-1.77	0.08	-12.91	0.66	1.62
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1983-1990]	Build date: 1983-1990 vs 1950-1966	-2.97	3.13	-0.95	0.34	-9.11	3.17	2.19
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1991-1995]	Build date: 1991-1995 vs 1950-1966	-0.86	4.01	-0.22	0.83	-8.72	7.00	1.46
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1996-2002]	Build date: 1996-2002 vs 1950-1966	-1.71	3.33	-0.51	0.61	-8.24	4.82	1.89
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: before 1900]	Build date: Before 1900 vs 1950-1966	1.54	3.67	0.42	0.68	-5.66	8.74	2.36
C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Walls energy eff.: Average vs good or very good	-3.51	3.06	-1.15	0.25	-9.51	2.50	1.58
C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Walls energy eff.: Poor vs good or very good	-2.57	2.41	-1.07	0.29	-7.29	2.15	2.25

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C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Walls energy eff.: very poor vs good or very good	-5.69	2.90	-1.96	0.05	-11.38	0.00	5.43
C(roofEnergyEff, Treatment(reference="Good"))[T.Average]	Roof energy eff.: average vs good	1.20	1.92	0.62	0.53	-2.56	4.95	1.77
C(roofEnergyEff, Treatment(reference="Good"))[T.Poor]	Roof energy eff.: Poor vs good	0.91	3.48	0.26	0.79	-5.91	7.74	1.28
C(roofEnergyEff, Treatment(reference="Good"))[T.Very Good]	Roof energy eff.: Very good vs good	3.29	2.73	1.21	0.23	-2.06	8.65	1.34
C(roofEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Roof energy eff.: very poor vs good	-5.71	2.51	-2.28	0.02	-10.62	-0.80	1.98
C(roofEnergyEff, Treatment(reference="Good"))[T.n/a or missing]	Roof energy eff.: n/a or missing vs good	-2.53	3.59	-0.71	0.48	-9.55	4.50	2.86
C(mainheatEnergyEff, Treatment(reference="Good"))[T.Average]	Main heat energy eff.: average vs good	-4.94	4.38	-1.13	0.26	-13.53	3.65	2.69
C(mainheatEnergyEff, Treatment(reference="Good"))[T.Poor or very poor]	Main heat energy eff.: Poor or very poor vs good	-2.80	5.29	-0.53	0.60	-13.17	7.57	2.21
C(mainheatEnergyEff, Treatment(reference="Good"))[T.Very Good]	Main heat energy eff.: very good vs good	-14.12	6.51	-2.17	0.03	-26.87	-1.37	3.54
C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Main heat controls energy eff.: average vs good or very good	-0.26	1.63	-0.16	0.87	-3.46	2.93	2.08
C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Main heat controls energy eff.: Poor vs good or very good	-5.07	3.82	-1.33	0.18	-12.55	2.41	2.00
C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Main heat controls energy eff.: Very poor vs good or very good	-0.13	3.54	-0.04	0.97	-7.06	6.80	1.40
C(windowsEnergyEff, Treatment(reference="Average"))[T.Good]	Windows energy eff.: Good vs average	1.07	1.64	0.65	0.51	-2.15	4.29	1.97
C(windowsEnergyEff, Treatment(reference="Average"))[T.Poor]	Windows energy eff.: Poor vs average	8.32	2.88	2.89	0.00	2.67	13.96	1.48
C(windowsEnergyEff, Treatment(reference="Average"))[T.Very Poor]	Windows energy eff.: Very poor vs average	4.14	3.63	1.14	0.25	-2.97	11.24	1.35
C(propertyType, Treatment(reference="House"))[T.Bungalow]	Bungalow vs house	0.77	2.43	0.32	0.75	-4.00	5.53	1.81
C(propertyType, Treatment(reference="House"))[T.Flat or maisonette]	Flat or maisonette vs house	0.06	3.42	0.02	0.99	-6.65	6.77	4.26
C(builtForm, Treatment(reference="Semi-Detached"))[T.Detached]	Detached vs semi-detached	3.42	1.99	1.72	0.09	-0.48	7.32	2.78

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C(builtForm, Treatment(reference="Semi-Detached"))[T.Enclosed terrace or no data]	Enclosed terrace or no data vs semi-detached	-7.32	4.64	-1.58	0.12	-16.41	1.77	1.40
C(builtForm, Treatment(reference="Semi-Detached"))[T.End-Terrace]	End-terrace vs semi-detached	-6.86	2.46	-2.79	0.01	-11.68	-2.05	1.60
C(builtForm, Treatment(reference="Semi-Detached"))[T.Mid-Terrace]	Mid-terrace vs semi-detached	-8.16	2.06	-3.95	0.00	-12.20	-4.11	2.55
hdd_c	Heating degree days (centred)	5.43	0.70	7.79	0.00	4.07	6.80	72.05
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-0.78	0.36	-2.16	0.03	-1.49	-0.07	1.94
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	-0.30	0.34	-0.89	0.37	-0.97	0.36	1.97
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	0.08	0.33	0.24	0.82	-0.57	0.73	2.65
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-0.73	0.40	-1.82	0.07	-1.52	0.06	1.67
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	0.14	0.34	0.40	0.69	-0.53	0.80	2.08
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-0.95	0.42	-2.28	0.02	-1.77	-0.13	1.72
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-0.49	0.38	-1.31	0.19	-1.23	0.24	1.92
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	-0.08	0.45	-0.18	0.86	-0.97	0.81	1.93
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	0.45	0.31	1.46	0.14	-0.15	1.06	1.85
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	0.10	0.28	0.34	0.73	-0.46	0.65	1.96
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	0.85	0.27	3.08	0.00	0.31	1.38	2.44
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	0.78	0.28	2.78	0.01	0.23	1.33	2.57
hdd_c:C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	-0.08	0.04	-1.92	0.06	-0.16	0.00	2.12
hdd_c:C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	0.03	0.04	0.84	0.40	-0.05	0.11	2.14
hdd_c:C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	-0.23	0.04	-5.58	0.00	-0.31	-0.15	2.03
hdd_c:C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	-0.07	0.04	-1.57	0.12	-0.15	0.02	2.00

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hdd_c:C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	0.06	0.04	1.40	0.16	-0.02	0.14	1.96
hdd_c:C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	0.10	0.04	2.26	0.02	0.01	0.18	1.93
hdd_c:C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-1.51	0.12	-	0.00	-1.74	-1.28	2.02
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Portable electric/assumed]	Has Portable electric/assumed	0.38	0.69	12.76	0.59	-0.97	1.72	1.44
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, electric]	Has Room heaters, electric	-0.50	0.29	-1.72	0.09	-1.06	0.07	1.75
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, mains gas]	Has Room heaters, mains gas	-0.12	0.25	-0.48	0.63	-0.61	0.37	2.57
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, solid fuel]	Has Room heaters, solid fuel	-0.28	0.48	-0.58	0.56	-1.22	0.67	1.56
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, wood logs]	Has Room heaters, wood logs	-0.85	0.55	-1.55	0.12	-1.92	0.23	1.36
hdd_c:C(glazedArea, Treatment(reference="Normal or less than typical"))[T.More than typical or much more than typical]	Glazed area: More than typical or much more than typical vs Normal or less than typical	-0.23	0.49	-0.46	0.65	-1.18	0.73	1.15
hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Average]	Hot water energy efficiency: average vs good	-0.01	0.30	-0.03	0.98	-0.59	0.58	1.79
hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Poor]	Hot water energy efficiency: poor vs good	-0.91	0.52	-1.75	0.08	-1.94	0.11	1.82
hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Good]	Hot water energy efficiency: very good vs good	1.42	0.76	1.88	0.06	-0.06	2.90	3.28
hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Hot water energy efficiency: very poor vs good	-1.78	0.70	-2.54	0.01	-3.15	-0.41	2.08
hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Average]	Lighting energy efficiency: average vs very good	-0.03	0.72	-0.04	0.97	-1.44	1.39	15.54
hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Good]	Lighting energy efficiency: good vs very good	0.30	0.47	0.64	0.52	-0.63	1.23	6.33
hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Poor]	Lighting energy efficiency: Poor vs very good	0.19	0.94	0.20	0.84	-1.65	2.03	14.94

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hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Very Poor]	Lighting energy efficiency: very poor vs very good	0.28	1.12	0.25	0.80	-1.90	2.47	29.50
hdd_c:C(tenure, Treatment(reference="owner-occupied"))[T.rental (private)]	Private rental vs owner/part-owner	0.34	0.28	1.21	0.23	-0.21	0.89	1.50
hdd_c:C(tenure, Treatment(reference="owner-occupied"))[T.rental (social) / Other]	Social rental / other vs owner/part-owner	-0.19	0.38	-0.50	0.62	-0.93	0.55	1.59
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.2003-2006 / 2007 onwards]	Build date: 2003-2006/2007 vs 1950-1966	-0.35	0.52	-0.66	0.51	-1.36	0.67	2.23
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1900-1929]	Build date: 1900-1929 vs 1950-1966	0.19	0.40	0.47	0.64	-0.60	0.98	3.58
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1930-1949]	Build date: 1930-1949 vs 1950-1966	0.15	0.34	0.45	0.65	-0.52	0.82	2.47
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1967-1975]	Build date: 1967-1975 vs 1950-1966	-0.36	0.34	-1.06	0.29	-1.03	0.31	1.86
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1976-1982]	Build date: 1976-1982 vs 1950-1966	-0.57	0.45	-1.27	0.21	-1.46	0.32	1.59
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1983-1990]	Build date: 1983-1990 vs 1950-1966	-0.55	0.41	-1.33	0.18	-1.35	0.26	2.23
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1991-1995]	Build date: 1991-1995 vs 1950-1966	-0.65	0.53	-1.24	0.22	-1.68	0.38	1.48
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1996-2002]	Build date: 1996-2002 vs 1950-1966	-0.34	0.44	-0.79	0.43	-1.20	0.51	1.93
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: before 1900]	Build date: Before 1900 vs 1950-1966	0.24	0.48	0.50	0.62	-0.70	1.18	2.41
hdd_c:C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Walls energy eff.: Average vs good or very good	-0.14	0.40	-0.34	0.73	-0.92	0.65	1.58

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hdd_c:C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Walls energy eff.: Poor vs good or very good	-0.18	0.32	-0.57	0.57	-0.80	0.44	2.26
hdd_c:C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Walls energy eff.: very poor vs good or very good	-0.51	0.38	-1.35	0.18	-1.26	0.23	5.60
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Average]	Roof energy eff.: average vs good	0.29	0.25	1.15	0.25	-0.20	0.78	1.81
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Poor]	Roof energy eff.: Poor vs good	0.05	0.46	0.10	0.92	-0.85	0.94	1.28
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Very Good]	Roof energy eff.: Very good vs good	0.62	0.36	1.73	0.08	-0.08	1.32	1.34
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Roof energy eff.: very poor vs good	-0.64	0.33	-1.96	0.05	-1.29	0.00	2.05
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.n/a or missing]	Roof energy eff.: n/a or missing vs good	-0.25	0.47	-0.54	0.59	-1.17	0.67	2.92
hdd_c:C(mainheatEnergyEff, Treatment(reference="Good"))[T.Average]	Main heat energy eff.: average vs good	-0.60	0.57	-1.04	0.30	-1.72	0.53	2.70
hdd_c:C(mainheatEnergyEff, Treatment(reference="Good"))[T.Poor or very poor]	Main heat energy eff.: Poor or very poor vs good	-0.65	0.70	-0.94	0.35	-2.02	0.71	2.22
hdd_c:C(mainheatEnergyEff, Treatment(reference="Good"))[T.Very Good]	Main heat energy eff.: very good vs good	-1.91	0.85	-2.25	0.03	-3.58	-0.25	3.43
hdd_c:C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Main heat controls energy eff.: average vs good or very good	-0.26	0.21	-1.20	0.23	-0.67	0.16	2.14
hdd_c:C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Main heat controls energy eff.: Poor vs good or very good	-0.67	0.50	-1.34	0.18	-1.65	0.31	2.03
hdd_c:C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Main heat controls energy eff.: Very poor vs good or very good	-0.45	0.46	-0.98	0.33	-1.36	0.46	1.43
hdd_c:C(windowsEnergyEff, Treatment(reference="Average"))[T.Good]	Windows energy eff.: Good vs average	-0.01	0.22	-0.03	0.97	-0.43	0.41	1.99
hdd_c:C(windowsEnergyEff, Treatment(reference="Average"))[T.Poor]	Windows energy eff.: Poor vs average	0.92	0.38	2.45	0.01	0.19	1.66	1.50
hdd_c:C(windowsEnergyEff, Treatment(reference="Average"))[T.Very Poor]	Windows energy eff.: Very poor vs average	0.23	0.48	0.48	0.63	-0.70	1.16	1.37
hdd_c:C(propertyType, Treatment(reference="House"))[T.Bungalow]	Bungalow vs house	0.25	0.32	0.78	0.44	-0.38	0.87	1.84

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hdd_c:C(propertyType, Treatment(reference="House"))[T.Flat or maisonette]	Flat or maisonette vs house	-0.01	0.45	-0.01	0.99	-0.88	0.87	4.30
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.Detached]	Detached vs semi-detached	0.50	0.26	1.93	0.05	-0.01	1.01	2.83
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.Enclosed terrace or no data]	Enclosed terrace or no data vs semi-detached	-1.01	0.61	-1.66	0.10	-2.20	0.18	1.42
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.End-Terrace]	End-terrace vs semi-detached	-0.64	0.32	-1.98	0.05	-1.27	-0.01	1.61
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.Mid-Terrace]	Mid-terrace vs semi-detached	-1.01	0.27	-3.75	0.00	-1.54	-0.48	2.61
totalFloorArea_c	Total floor area (centred)	0.31	0.03	9.87	0.00	0.24	0.37	4.21
total_rooms_epc_c	#N/A	-0.19	1.76	-0.11	0.91	-3.64	3.26	19.96
numberHeatedRooms_c	No. heated rooms (centred)	2.89	1.64	1.76	0.08	-0.33	6.10	18.11
energyConsumptionCurrent_c	Estimated primary energy use (kWh/m ² , centred)	0.02	0.02	0.89	0.37	-0.02	0.06	8.21
negativeCurrentEnergyEfficiency_c	Negative estimated energy efficiency	0.46	0.21	2.23	0.03	0.06	0.87	10.81
epcAge_c	Age of EPC (centred)	0.00	0.00	1.38	0.17	0.00	0.00	1.63
extensionCount_c	No. extensions (centred)	-0.02	1.02	-0.02	0.98	-2.02	1.97	1.47
lowEnergyLighting_c	Low energy lighting (% , centred)	0.00	0.09	-0.04	0.97	-0.19	0.18	11.60
numberOpenFireplaces_c	No. open fireplaces (centred)	-4.40	1.44	-3.05	0.00	-7.23	-1.57	1.74
solar_radiation_c	Surface solar radiation (centred)	-12.30	0.10	-	0.00	-12.49	-12.11	2.52
				127.88				
hdd_c:totalFloorArea_c	Total floor area (centred)	0.04	0.00	10.56	0.00	0.04	0.05	4.19
hdd_c:total_rooms_epc_c	#N/A	0.10	0.23	0.44	0.66	-0.35	0.55	19.89
hdd_c:numberHeatedRooms_c	No. heated rooms (centred)	0.24	0.21	1.14	0.26	-0.18	0.66	18.13
hdd_c:energyConsumptionCurrent_c	Estimated primary energy use (kWh/m ² , centred)	0.00	0.00	1.28	0.20	0.00	0.01	8.21

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hdd_c:negativeCurrentEnergyEfficiency_c	Negative estimated energy efficiency	0.07	0.03	2.49	0.01	0.01	0.12	10.78
hdd_c:epcAge_c	Age of EPC (centred)	0.00	0.00	0.85	0.40	0.00	0.00	1.64
hdd_c:extensionCount_c	No. extensions (centred)	0.15	0.13	1.12	0.27	-0.11	0.41	1.48
hdd_c:lowEnergyLighting_c	Low energy lighting (% , centred)	0.01	0.01	0.65	0.51	-0.02	0.03	22.46
hdd_c:numberOpenFireplaces_c	No. open fireplaces (centred)	-0.58	0.19	-3.04	0.00	-0.95	-0.21	1.74
hdd_c:solar_radiation_c	Surface solar radiation (centred)	-0.98	0.02	-	0.00	-1.03	-0.94	2.50
				41.57				
Group Var		293.58	0.94					
Group x hdd_c Cov		32.67	0.11					
hdd_c Var		4.95	0.02					

Table A 2. Regression results using linear mixed effects model with random intercept and hdd slope using basic data and EPC data. Dependent variable total energy consumption per day (kWh/day). Number of observations: 163107 . Number of groups: 617 . Min. group size: 53. Max. group size: 560. Mean group size: 264.4.

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Model with basic plus SERL survey data (larger sample)

Variable	Brief description	Coefficient	Standard error	z-score	p-value	95% CI (lower)	95% CI (upper)	VIF
Intercept		47.17	3.04	15.51	0.00	41.21	53.13	
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-7.68	2.02	-3.79	0.00	-11.64	-3.71	1.72
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	-1.16	1.91	-0.61	0.55	-4.90	2.59	1.69
C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	2.65	1.84	1.44	0.15	-0.95	6.24	2.08
C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-5.48	2.29	-2.39	0.02	-9.97	-0.99	1.92
C(Region, Treatment(reference="SOUTH EAST"))[T.SCOTLAND]	Scotland vs South East	-0.05	2.71	-0.02	0.98	-5.37	5.26	1.98
C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	-2.55	1.92	-1.33	0.19	-6.31	1.22	1.85
C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-5.77	2.49	-2.32	0.02	-10.65	-0.89	1.75
C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-2.78	2.04	-1.36	0.17	-6.78	1.22	1.74
C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	-4.46	2.62	-1.71	0.09	-9.59	0.67	1.84
C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	0.77	1.77	0.43	0.66	-2.70	4.23	1.86
C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	-0.14	1.60	-0.09	0.93	-3.28	3.00	2.04

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C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	0.01	1.53	0.01	1.00	-2.99	3.00	2.17
C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	3.39	1.58	2.14	0.03	0.29	6.49	2.44
C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	0.37	0.11	3.29	0.00	0.15	0.58	1.86
C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	-0.34	0.11	-3.06	0.00	-0.56	-0.12	1.90
C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	0.64	0.11	5.75	0.00	0.42	0.86	1.88
C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	1.22	0.11	11.04	0.00	1.01	1.44	1.88
C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	2.91	0.11	26.22	0.00	2.69	3.13	1.89
C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	2.28	0.11	20.44	0.00	2.06	2.50	1.86
C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-0.98	0.33	-3.01	0.00	-1.63	-0.34	1.94
C(Collection_method, Treatment(reference="Online"))[T.Postal]	Postal vs online response	1.56	1.13	1.37	0.17	-0.67	3.78	2.18
C(A2, Treatment(reference="Not at all"))[T.A little]	Smart meter effect: A little vs not at all	-2.67	1.24	-2.16	0.03	-5.09	-0.24	1.74
C(A2, Treatment(reference="Not at all"))[T.A lot]	Smart meter effect: A lot vs not at all	-3.09	2.09	-1.48	0.14	-7.17	1.00	1.38
C(A2, Treatment(reference="Not at all"))[T.Don't know or not applicable (A1: No)]	Smart meter effect: Don't know or n/a	3.38	3.17	1.07	0.29	-2.84	9.60	1.31

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C(A2, Treatment(reference="Not at all"))[T.Some]	Smart meter effect: Some vs not at all	0.21	1.51	0.14	0.89	-2.74	3.17	1.54
C(central_heating_serl, Treatment(reference="Gas"))[T.Both]	Central heating: Both fuels vs gas	3.77	3.15	1.20	0.23	-2.41	9.95	1.20
C(central_heating_serl, Treatment(reference="Gas"))[T.Electricity]	Central heating: Elec. vs gas	-20.87	4.44	-4.70	0.00	-29.58	-12.17	4.03
C(A4_timer, Treatment(reference=1))[T.0]	No timer heating control	2.79	1.79	1.56	0.12	-0.71	6.29	1.96
C(A4_temp, Treatment(reference=1))[T.0]	No temp. heating control	-0.25	2.00	-0.13	0.90	-4.18	3.67	3.22
C(A4_smart, Treatment(reference=0))[T.1]	Has smart heating control	-1.62	1.54	-1.05	0.30	-4.64	1.41	1.76
C(A4_manual, Treatment(reference=0))[T.1]	Manual heating control only	-0.10	2.55	-0.04	0.97	-5.11	4.91	1.47
C(A6_7_dummy_mains, Treatment(reference=0))[T.1.0]	Has mains powered standalone heaters	0.97	1.16	0.84	0.40	-1.29	3.23	2.20
C(A8_use_own, Treatment(reference="None or don't know"))[T.Daily]	Has non-mains powered standalone heaters, used daily	-2.61	4.30	-0.61	0.54	-11.05	5.83	1.21

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C(A8_use_own, Treatment(reference="None or don't know"))[T.Most days]	Has non-mains powered standalone heaters, used most days	1.33	3.38	0.39	0.69	-5.30	7.96	1.22
C(A8_use_own, Treatment(reference="None or don't know"))[T.Rarely or never]	Has non-mains powered standalone heaters, used rarely or never	-0.59	3.09	-0.19	0.85	-6.65	5.47	1.19
C(A8_use_own, Treatment(reference="None or don't know"))[T.Varies]	Has non-mains powered standalone heaters, use varies	1.99	3.36	0.59	0.55	-4.60	8.57	1.16
C(A9_cold, Treatment(reference=1))[T.0]	Does not adjust heating when cold	0.05	2.33	0.02	0.98	-4.53	4.62	2.85
C(A9_children, Treatment(reference=0))[T.1]	Adjusts heating for children	-0.43	1.79	-0.24	0.81	-3.94	3.07	1.54
C(A9_visitors, Treatment(reference=0))[T.1]	Adjusts heating for visitors	-3.36	1.26	-2.66	0.01	-5.84	-0.89	1.78
C(A9_pets, Treatment(reference=0))[T.1]	Adjusts heating for pets	-0.49	4.10	-0.12	0.90	-8.53	7.55	1.13

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C(A9_illness, Treatment(reference=0))[T.1]	Adjusts heating when ill	1.41	1.43	0.98	0.33	-1.40	4.21	1.52
C(A9_wfh, Treatment(reference=0))[T.1]	Adjusts heating when WFH	2.12	1.33	1.60	0.11	-0.48	4.72	2.07
C(A9_none, Treatment(reference=0))[T.1]	Adjusts heating: none of the above	1.47	3.00	0.49	0.63	-4.41	7.34	2.82
C(A10_how_often, Treatment(reference="Always"))[T.Never]	Adjusts heating when unoccupied: Never (vs always)	1.16	1.75	0.67	0.51	-2.26	4.58	1.48
C(A10_how_often, Treatment(reference="Always"))[T.Not_applicable]	Adjusts heating when unoccupied: n/a (vs always)	1.50	2.67	0.56	0.58	-3.74	6.73	1.39
C(A10_how_often, Treatment(reference="Always"))[T.Not_very_often]	Adjusts heating when unoccupied: Not very often (vs always)	3.03	1.58	1.92	0.06	-0.06	6.12	1.47
C(A10_how_often, Treatment(reference="Always"))[T.Quite_often]	Adjusts heating when unoccupied: Quite often (vs always)	2.08	1.69	1.23	0.22	-1.24	5.40	1.39

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C(A10_how_often, Treatment(reference="Always"))[T.Very_often]	Adjusts heating when unoccupied: Very often (vs always)	4.01	1.54	2.60	0.01	0.99	7.03	1.53
C(A11, Treatment(reference="No"))[T.Yes]	Living spaces not heated during winter	-2.88	1.09	-2.64	0.01	-5.01	-0.74	1.77
C(hot_water_taps, Treatment(reference="Gas"))[T.Both]	Taps hot water fuel: Both vs gas	9.17	5.05	1.82	0.07	-0.72	19.06	1.56
C(hot_water_taps, Treatment(reference="Gas"))[T.Electricity]	Taps hot water fuel: Electricity vs gas	8.77	4.11	2.13	0.03	0.71	16.83	4.12
C(hot_water_taps, Treatment(reference="Gas"))[T.Neither]	Taps hot water fuel: Neither electricity or gas	-1.28	2.33	-0.55	0.58	-5.85	3.29	8.09
C(hot_water_shower, Treatment(reference="Gas"))[T.Both]	Shower hot water fuel: Both fuels vs gas	-1.78	3.29	-0.54	0.59	-8.24	4.67	1.69
C(hot_water_shower, Treatment(reference="Gas"))[T.Dont know]	Shower hot water fuel: Don't know vs gas	2.53	2.44	1.04	0.30	-2.25	7.31	6.75

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C(hot_water_shower, Treatment(reference="Gas"))[T.Electricity]	Shower hot water fuel: Electricity vs gas	-1.10	1.79	-0.61	0.54	-4.61	2.42	2.79
C(hot_water_shower, Treatment(reference="Gas"))[T.Neither]	Shower hot water fuel: Neither vs gas	-1.85	4.50	-0.41	0.68	-10.67	6.96	1.31
C(A13_often_lights, Treatment(reference="Always"))[T.Quite often, not very often, not applicable, or never]	How often do you switch off lights: Quite often, not very often, not applicable, or never vs always	3.49	1.85	1.89	0.06	-0.13	7.11	1.49
C(A13_often_lights, Treatment(reference="Always"))[T.Very often]	How often do you switch off lights: very often vs always	1.20	1.17	1.02	0.31	-1.10	3.49	1.86
C(A13_often_clothes, Treatment(reference="Very often"))[T.Always]	How often do you put on more clothes when it is cold: Always vs very often	-1.48	1.42	-1.04	0.30	-4.27	1.30	1.81

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C(A13_often_clothes, Treatment(reference="Very often"))[T.Never, or not applicable]	How often do you put on more clothes when it is cold: Never or n/a vs very often	3.21	3.60	0.89	0.37	-3.83	10.26	1.27
C(A13_often_clothes, Treatment(reference="Very often"))[T.Not very often]	How often do you put on more clothes when it is cold: Not very often vs very often	2.51	1.73	1.45	0.15	-0.88	5.91	1.63
C(A13_often_clothes, Treatment(reference="Very often"))[T.Quite often]	How often do you put on more clothes when it is cold: Quite often vs very often	0.19	1.28	0.15	0.88	-2.32	2.71	2.05
C(A14, Treatment(reference="Some effort"))[T.A great deal of effort]	Effort to limit energy use: A great deal of effort vs some effort	-5.38	1.34	-4.01	0.00	-8.01	-2.75	1.81
C(A14, Treatment(reference="Some effort"))[T.A little effort]	Effort to limit	0.87	1.43	0.61	0.54	-1.92	3.67	1.69

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	energy use: A little effort vs some effort								
C(A14, Treatment(reference="Some effort"))[T.No effort at all or don't know]	Effort to limit energy use: No effort or don't know vs some effort	-1.31	3.04	-0.43	0.67	-7.26	4.64	1.28	
C(A15_cold, Treatment(reference="Not very often"))[T.Always]	Open windows, cold day: Always vs not very often	3.16	2.40	1.32	0.19	-1.54	7.85	1.25	
C(A15_cold, Treatment(reference="Not very often"))[T.Never or don't know]	Open windows, cold day: Never or don't know vs not very often	1.54	1.41	1.10	0.27	-1.21	4.30	1.78	
C(A15_cold, Treatment(reference="Not very often"))[T.Quite often]	Open windows, cold day: Quite often vs not very often	0.05	1.42	0.03	0.98	-2.73	2.82	1.56	

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C(A15_cold, Treatment(reference="Not very often"))[T.Very often]	Open windows, cold day: Very often vs not very often	2.04	2.12	0.96	0.34	-2.12	6.21	1.31
C(A15_warm, Treatment(reference="Always"))[T.Not very often or never]	Open windows, warm day: Not very often or never vs always	0.81	2.60	0.31	0.76	-4.28	5.90	1.39
C(A15_warm, Treatment(reference="Always"))[T.Quite often]	Open windows, warm day: Quite often or never vs always	-6.25	2.04	-3.06	0.00	-10.25	-2.24	1.40
C(A15_warm, Treatment(reference="Always"))[T.Very often]	Open windows, warm day: Very often or never vs always	-0.28	1.24	-0.23	0.82	-2.71	2.15	1.83
C(A16_no, Treatment(reference=1))[T.0.0]	Considering changes to heating or energy supply in 12 months	-6.25	3.43	-1.82	0.07	-12.97	0.47	7.18
C(A16_na, Treatment(reference=0))[T.1.0]	Considering changes to heating or energy	10.37	4.33	2.40	0.02	1.89	18.85	4.23

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	supply in 12 months: n/a								
C(A16_gas_boiler, Treatment(reference=0))[T.1.0]	Considerin g gas boiler	8.15	3.89	2.10	0.04	0.53	15.76	2.94	
C(A16_pv, Treatment(reference=0))[T.1.0]	Considerin g solar PV	6.64	4.08	1.63	0.10	-1.34	14.63	1.78	
C(A16_wood_burner, Treatment(reference=0))[T.1.0]	Considerin g wood burner	-3.16	5.68	-0.56	0.58	-14.29	7.97	1.49	
C(B4, Treatment(reference="Own / part-own"))[T.Private rental]	Private rental vs owner/par t-owner	-1.75	2.38	-0.73	0.46	-6.41	2.92	1.56	
C(B4, Treatment(reference="Own / part-own"))[T.Social rental / rent free]	Social rental / rent free vs owner/par t-owner	-0.51	2.32	-0.22	0.82	-5.06	4.03	1.75	
C(B7_keepwarm, Treatment(reference="Yes"))[T.No or don't know]	Cannot keep warm in winter or don't know	-0.79	2.36	-0.34	0.74	-5.41	3.82	1.34	
C(B8_damp, Treatment(reference="No"))[T.Dont_know]	Problem with damp: don't know vs no	-6.09	4.13	-1.47	0.14	-14.19	2.01	1.15	
C(B8_damp, Treatment(reference="No"))[T.Yes]	Problem with	1.11	1.33	0.84	0.40	-1.50	3.72	1.62	

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	damp: Yes vs no							
C(B10_elec_oven, Treatment(reference=1))[T.0]	Does not have electric oven	-2.95	2.80	-1.05	0.29	-8.43	2.54	6.30
C(B10_gas_oven, Treatment(reference=0))[T.1]	Has gas oven	1.07	2.69	0.40	0.69	-4.21	6.34	6.45
C(B10_elec_hob, Treatment(reference=0))[T.1]	Has electric hob	0.12	1.97	0.06	0.95	-3.74	3.98	5.94
C(B10_gas_hob, Treatment(reference=1))[T.0]	Does not have gas hob	0.08	1.82	0.04	0.97	-3.49	3.64	6.22
C(B10_dish, Treatment(reference=1))[T.0]	Does not have dishwashe r	-2.61	1.23	-2.13	0.03	-5.01	-0.20	2.71
C(B10_fridge, Treatment(reference=1))[T.0]	Does not have fridge	0.96	3.10	0.31	0.76	-5.11	7.04	1.21
C(B10_freezer, Treatment(reference=0))[T.1]	Has standalon e freezer	0.61	1.10	0.55	0.58	-1.55	2.76	1.97
C(B10_combined_wash, Treatment(reference=0))[T.1]	Has combined clothes washer dryer	-4.05	4.08	-0.99	0.32	-12.05	3.95	10.14
C(B10_washing, Treatment(reference=1))[T.0]	Does not have washing machine	6.70	4.04	1.66	0.10	-1.22	14.62	10.54
C(B10_dryer, Treatment(reference=0))[T.1]	Has tumble dryer	1.37	1.20	1.14	0.25	-0.98	3.71	2.97

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C(B10_laptop, Treatment(reference=1))[T.0]	Does not have laptop or computer	-3.67	1.88	-1.96	0.05	-7.35	0.01	1.43
C(B10_tv, Treatment(reference=1))[T.0]	Does not have TV	2.73	2.69	1.02	0.31	-2.54	8.01	1.23
C(B10_acu, Treatment(reference=0))[T.1]	Has ACU	12.01	3.04	3.95	0.00	6.04	17.98	1.16
C(B10_fan, Treatment(reference=0))[T.1]	Has cooling fan	-0.16	1.08	-0.15	0.89	-2.26	1.95	1.91
C(D4, Treatment(reference="Doing alright"))[T.Finding it quite difficult]	Managing financially: Finding it quite difficult vs doing alright	1.59	3.16	0.50	0.62	-4.60	7.77	1.33
C(D4, Treatment(reference="Doing alright"))[T.Finding it very difficult / prefer not to say / dont know]	Managing financially: Finding it very difficult / prefer not to say / dont know vs doing alright	0.51	2.85	0.18	0.86	-5.07	6.09	1.26
C(D4, Treatment(reference="Doing alright"))[T.Just about getting by]	Managing financially: Just about getting by vs doing alright	1.78	1.55	1.15	0.25	-1.26	4.81	1.65
C(D4, Treatment(reference="Doing alright"))[T.Living comfortably]	Managing financially: Living	0.79	1.20	0.66	0.51	-1.56	3.13	2.17

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	comfortably vs doing alright								
C(B9, Treatment(reference="1950 to 1975"))[T.1900 to 1929]	Build date: 1900-1929 vs 1950-1975	9.55	1.83	5.22	0.00	5.97	13.14	1.82	
C(B9, Treatment(reference="1950 to 1975"))[T.1930 to 1949]	Build date: 1930-1949 vs 1950-1975	5.37	1.66	3.23	0.00	2.11	8.62	1.81	
C(B9, Treatment(reference="1950 to 1975"))[T.1976 to 1990]	Build date: 1976-1990 vs 1950-1975	-3.39	1.68	-2.02	0.04	-6.67	-0.11	1.66	
C(B9, Treatment(reference="1950 to 1975"))[T.1991 to 2002]	Build date: 1991-2002 vs 1950-1975	-5.90	1.92	-3.07	0.00	-9.67	-2.14	1.60	
C(B9, Treatment(reference="1950 to 1975"))[T.2003 onwards]	Build date: 2003 onwards vs 1950-1975	-9.50	2.12	-4.48	0.00	-13.66	-5.34	1.50	
C(B9, Treatment(reference="1950 to 1975"))[T.Before 1900]	Build date: Before 1900 vs 1950-1975	11.37	2.10	5.43	0.00	7.27	15.48	1.76	
C(B9, Treatment(reference="1950 to 1975"))[T.Dont know]	Build date: Don't know vs 1950-1975	2.56	3.13	0.82	0.41	-3.57	8.69	1.45	
C(B1, Treatment(reference="Semi detached"))[T.Converted house or commercial building]	Converted house or commercial building	-2.03	3.81	-0.53	0.59	-9.51	5.44	1.33	

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	vs semi-detached								
C(B1, Treatment(reference="Semi detached"))[T.Detached]	Detached vs semi-detached	6.44	1.48	4.34	0.00	3.53	9.35	2.81	
C(B1, Treatment(reference="Semi detached"))[T.Purpose built flat]	Purpose built flat vs semi-detached	-4.20	2.21	-1.90	0.06	-8.52	0.13	2.00	
C(B1, Treatment(reference="Semi detached"))[T.Terraced]	Terraced vs semi-detached	-4.99	1.41	-3.55	0.00	-7.75	-2.23	2.28	
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.<=19.0]	Heating set-point: <=19C vs >20C & <=22C	-5.30	1.46	-3.62	0.00	-8.16	-2.43	1.90	
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>19.0 & <=20.0]	Heating set-point: >19C & <=20C vs >20C & <=22C	-3.48	1.43	-2.43	0.02	-6.28	-0.67	1.81	
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>22.0]	Heating set-point: >22C vs >20C & <=22C	6.61	1.95	3.40	0.00	2.80	10.42	1.42	
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.Not applicable]	Heating set-point: n/a vs >20C & <=22C	-2.23	2.02	-1.10	0.27	-6.19	1.73	3.35	
hdd_c	Heating degree	4.94	0.42	11.75	0.00	4.11	5.76	47.86	

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	days (centred)							
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-0.72	0.28	-2.58	0.01	-1.27	-0.17	1.84
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	-0.14	0.26	-0.53	0.60	-0.66	0.38	1.83
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	0.35	0.25	1.40	0.16	-0.14	0.85	2.25
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-0.51	0.32	-1.61	0.11	-1.13	0.11	1.96
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.SCOTLAND]	Scotland vs South East	-0.25	0.38	-0.68	0.50	-0.99	0.48	2.24
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	-0.08	0.27	-0.31	0.76	-0.60	0.44	1.89
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-0.66	0.34	-1.92	0.06	-1.33	0.01	1.76
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-0.09	0.28	-0.33	0.74	-0.65	0.46	1.85
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	-0.10	0.36	-0.28	0.78	-0.81	0.61	1.94
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	0.22	0.24	0.88	0.38	-0.26	0.69	1.92
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	-0.06	0.22	-0.26	0.79	-0.49	0.38	2.13
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	0.17	0.21	0.81	0.42	-0.24	0.58	2.37
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	0.66	0.22	3.02	0.00	0.23	1.09	2.72

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hdd_c:C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	-0.07	0.03	-2.40	0.02	-0.12	-0.01	2.12
hdd_c:C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	0.04	0.03	1.56	0.12	-0.01	0.10	2.13
hdd_c:C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	-0.25	0.03	-8.57	0.00	-0.30	-0.19	2.02
hdd_c:C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	-0.08	0.03	-2.72	0.01	-0.13	-0.02	2.00
hdd_c:C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	0.05	0.03	1.54	0.12	-0.01	0.10	1.95
hdd_c:C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	0.11	0.03	3.70	0.00	0.05	0.17	1.94
hdd_c:C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-1.30	0.08	-15.78	0.00	-1.46	-1.14	1.98
hdd_c:C(Collection_method, Treatment(reference="Online"))[T.Postal]	Postal vs online response	0.26	0.16	1.67	0.10	-0.05	0.57	2.25
hdd_c:C(A2, Treatment(reference="Not at all"))[T.A little]	Smart meter effect: A little vs not at all	-0.34	0.17	-1.99	0.05	-0.67	-0.01	1.78
hdd_c:C(A2, Treatment(reference="Not at all"))[T.A lot]	Smart meter effect: A lot vs not at all	-0.21	0.29	-0.72	0.47	-0.77	0.36	1.39
hdd_c:C(A2, Treatment(reference="Not at all"))[T.Don't know or not applicable (A1: No)]	Smart meter effect: Don't know or n/a	0.35	0.44	0.80	0.42	-0.51	1.21	1.30
hdd_c:C(A2, Treatment(reference="Not at all"))[T.Some]	Smart meter effect:	0.05	0.21	0.22	0.83	-0.36	0.45	1.56

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	Some vs not at all							
hdd_c:C(central_heating_serl, Treatment(reference="Gas"))[T.Both]	Central heating: Both fuels vs gas	0.79	0.44	1.81	0.07	-0.06	1.64	1.21
hdd_c:C(central_heating_serl, Treatment(reference="Gas"))[T.Electricity]	Central heating: Elec. vs gas	-2.57	0.61	-4.18	0.00	-3.77	-1.37	4.00
hdd_c:C(A4_timer, Treatment(reference=1))[T.0]	No timer heating control	0.50	0.25	2.02	0.04	0.02	0.98	1.95
hdd_c:C(A4_temp, Treatment(reference=1))[T.0]	No temp. heating control	-0.11	0.28	-0.41	0.68	-0.66	0.43	3.25
hdd_c:C(A4_smart, Treatment(reference=0))[T.1]	Has smart heating control	-0.27	0.21	-1.27	0.20	-0.69	0.15	1.77
hdd_c:C(A4_manual, Treatment(reference=0))[T.1]	Manual heating control only	0.01	0.35	0.02	0.98	-0.68	0.70	1.46
hdd_c:C(A6_7_dummy_mains, Treatment(reference=0))[T.1.0]	Has mains powered standalone heaters	-0.04	0.16	-0.24	0.81	-0.35	0.28	2.24
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Daily]	Has non-mains powered standalone heaters, used daily	-0.35	0.59	-0.59	0.56	-1.52	0.81	1.22
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Most days]	Has non-mains powered	0.30	0.47	0.64	0.53	-0.62	1.21	1.23

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	standalone heaters, used most days								
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Rarely or never]	Has non-mains powered standalone heaters, used rarely or never	0.02	0.43	0.04	0.97	-0.82	0.85	1.21	
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Varies]	Has non-mains powered standalone heaters, use varies	0.28	0.46	0.59	0.55	-0.63	1.18	1.17	
hdd_c:C(A9_cold, Treatment(reference=1))[T.0]	Does not adjust heating when cold	-0.01	0.32	-0.04	0.97	-0.64	0.62	2.88	
hdd_c:C(A9_children, Treatment(reference=0))[T.1]	Adjusts heating for children	0.00	0.25	0.02	0.99	-0.48	0.49	1.57	
hdd_c:C(A9_visitors, Treatment(reference=0))[T.1]	Adjusts heating for visitors	-0.38	0.17	-2.19	0.03	-0.72	-0.04	1.79	
hdd_c:C(A9_pets, Treatment(reference=0))[T.1]	Adjusts heating for pets	-0.31	0.57	-0.54	0.59	-1.42	0.80	1.13	
hdd_c:C(A9_illness, Treatment(reference=0))[T.1]	Adjusts heating when ill	0.28	0.20	1.40	0.16	-0.11	0.66	1.54	

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hdd_c:C(A9_wfh, Treatment(reference=0))[T.1]	Adjusts heating when WFH	0.32	0.18	1.72	0.09	-0.04	0.68	2.11
hdd_c:C(A9_none, Treatment(reference=0))[T.1]	Adjusts heating: none of the above	0.48	0.41	1.15	0.25	-0.33	1.29	2.84
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Never]	Adjusts heating when unoccupied: Never (vs always)	-0.08	0.24	-0.33	0.74	-0.55	0.39	1.50
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Not_applicable]	Adjusts heating when unoccupied: n/a (vs always)	-0.18	0.37	-0.48	0.64	-0.90	0.55	1.39
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Not_very_often]	Adjusts heating when unoccupied: Not very often (vs always)	0.29	0.22	1.35	0.18	-0.13	0.72	1.51
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Quite_often]	Adjusts heating when unoccupied: Quite often (vs always)	0.15	0.23	0.63	0.53	-0.31	0.60	1.41
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Very_often]	Adjusts heating when	0.42	0.21	1.98	0.05	0.00	0.84	1.57

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	unoccupied: Very often (vs always)							
hdd_c:C(A11, Treatment(reference="No"))[T.Yes]	Living spaces not heated during winter	-0.49	0.15	-3.27	0.00	-0.79	-0.20	1.81
hdd_c:C(hot_water_taps, Treatment(reference="Gas"))[T.Both]	Taps hot water fuel: Both vs gas	0.63	0.70	0.90	0.37	-0.73	1.99	1.57
hdd_c:C(hot_water_taps, Treatment(reference="Gas"))[T.Electricity]	Taps hot water fuel: Electricity or gas	1.00	0.57	1.77	0.08	-0.11	2.12	4.10
hdd_c:C(hot_water_taps, Treatment(reference="Gas"))[T.Neither]	Taps hot water fuel: Neither electricity or gas	-0.18	0.32	-0.55	0.59	-0.81	0.46	8.05
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Both]	Shower hot water fuel: Both fuels vs gas	0.14	0.45	0.31	0.75	-0.75	1.03	1.70
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Dont know]	Shower hot water fuel: Don't know vs gas	0.32	0.34	0.94	0.35	-0.34	0.98	6.51
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Electricity]	Shower hot water fuel:	0.01	0.25	0.02	0.98	-0.48	0.49	2.86

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	Electricity vs gas							
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Neither]	Shower hot water fuel: Neither vs gas	-0.36	0.62	-0.58	0.56	-1.58	0.86	1.29
hdd_c:C(A13_often_lights, Treatment(reference="Always"))[T.Quite often, not very often, not applicable, or never]	How often do you switch off lights: Quite often, not very often, not applicable, or never vs always	0.22	0.26	0.87	0.39	-0.28	0.72	1.50
hdd_c:C(A13_often_lights, Treatment(reference="Always"))[T.Very often]	How often do you switch off lights: very often vs always	0.15	0.16	0.91	0.36	-0.17	0.46	1.89
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Always]	How often do you put on more clothes when it is cold: Always vs very often	-0.18	0.20	-0.94	0.35	-0.57	0.20	1.85
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Never, or not applicable]	How often do you put on more clothes	0.52	0.50	1.04	0.30	-0.46	1.49	1.29

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	when it is cold: Never or n/a vs very often								
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Not very often]	How often do you put on more clothes when it is cold: Not very often vs very often	0.03	0.24	0.12	0.91	-0.44	0.50	1.67	
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Quite often]	How often do you put on more clothes when it is cold: Quite often vs very often	0.02	0.18	0.10	0.92	-0.33	0.37	2.10	
hdd_c:C(A14, Treatment(reference="Some effort"))[T.A great deal of effort]	Effort to limit energy use: A great deal of effort vs some effort	-0.80	0.19	-4.33	0.00	-1.17	-0.44	1.83	
hdd_c:C(A14, Treatment(reference="Some effort"))[T.A little effort]	Effort to limit energy use: A little effort	0.02	0.20	0.09	0.93	-0.37	0.40	1.70	

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	vs some effort							
hdd_c:C(A14, Treatment(reference="Some effort"))[T.No effort at all or don't know]	Effort to limit energy use: No effort or don't know vs some effort	-0.33	0.42	-0.79	0.43	-1.15	0.49	1.28
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Always]	Open windows, cold day: Always vs not very often	0.20	0.33	0.60	0.55	-0.45	0.85	1.25
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Never or don't know]	Open windows, cold day: Never or don't know vs not very often	0.25	0.19	1.29	0.20	-0.13	0.63	1.80
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Quite often]	Open windows, cold day: Quite often vs not very often	-0.11	0.20	-0.56	0.57	-0.49	0.27	1.58
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Very often]	Open windows, cold day: Very often	0.24	0.29	0.83	0.41	-0.33	0.82	1.32

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	vs not very often							
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Not very often or never]	Open windows, warm day: Not very often or never vs always	0.05	0.36	0.14	0.89	-0.65	0.75	1.40
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Quite often]	Open windows, warm day: Quite often or never vs always	-0.70	0.28	-2.50	0.01	-1.26	-0.15	1.43
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Very often]	Open windows, warm day: Very often or never vs always	-0.07	0.17	-0.43	0.67	-0.41	0.26	1.88
hdd_c:C(A16_no, Treatment(reference=1))[T.0.0]	Considering changes to heating or energy supply in 12 months	-0.56	0.47	-1.17	0.24	-1.48	0.37	7.39
hdd_c:C(A16_na, Treatment(reference=0))[T.1.0]	Considering changes to heating or energy supply in 12 months: n/a	0.93	0.60	1.56	0.12	-0.24	2.10	4.33

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hdd_c:C(A16_gas_boiler, Treatment(reference=0))[T.1.0]	Considerin g gas boiler	0.65	0.54	1.21	0.23	-0.40	1.70	3.01
hdd_c:C(A16_pv, Treatment(reference=0))[T.1.0]	Considerin g solar PV	0.69	0.56	1.22	0.22	-0.42	1.79	1.81
hdd_c:C(A16_wood_burner, Treatment(reference=0))[T.1.0]	Considerin g wood burner	-0.98	0.78	-1.25	0.21	-2.52	0.56	1.49
hdd_c:C(B4, Treatment(reference="Own / part-own"))[T.Private rental]	Private rental vs owner/par t-owner	-0.22	0.33	-0.66	0.51	-0.86	0.43	1.58
hdd_c:C(B4, Treatment(reference="Own / part-own"))[T.Social rental / rent free]	Social rental / rent free vs owner/par t-owner	-0.14	0.32	-0.43	0.67	-0.77	0.49	1.76
hdd_c:C(B7_keepwarm, Treatment(reference="Yes"))[T.No or don't know]	Cannot keep warm in winter or don't know	0.18	0.33	0.56	0.58	-0.46	0.82	1.35
hdd_c:C(B8_damp, Treatment(reference="No"))[T.Dont_know]	Problem with damp: don't know vs no	-0.54	0.57	-0.95	0.34	-1.66	0.58	1.16
hdd_c:C(B8_damp, Treatment(reference="No"))[T.Yes]	Problem with damp: Yes vs no	0.00	0.18	0.00	1.00	-0.36	0.36	1.61
hdd_c:C(B10_elec_oven, Treatment(reference=1))[T.0]	Does not have	-0.20	0.39	-0.52	0.60	-0.96	0.56	6.30

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	electric oven							
hdd_c:C(B10_gas_oven, Treatment(reference=0))[T.1]	Has gas oven	-0.10	0.37	-0.28	0.78	-0.83	0.63	6.40
hdd_c:C(B10_elec_hob, Treatment(reference=0))[T.1]	Has electric hob	0.33	0.27	1.20	0.23	-0.21	0.86	5.96
hdd_c:C(B10_gas_hob, Treatment(reference=1))[T.0]	Does not have gas hob	-0.09	0.25	-0.35	0.73	-0.58	0.41	6.20
hdd_c:C(B10_dish, Treatment(reference=1))[T.0]	Does not have dishwasher	-0.26	0.17	-1.55	0.12	-0.60	0.07	2.81
hdd_c:C(B10_fridge, Treatment(reference=1))[T.0]	Does not have fridge	0.41	0.43	0.96	0.34	-0.43	1.25	1.21
hdd_c:C(B10_freezer, Treatment(reference=0))[T.1]	Has standalone freezer	0.00	0.15	0.01	0.99	-0.30	0.30	2.01
hdd_c:C(B10_combined_wash, Treatment(reference=0))[T.1]	Has combined clothes washer dryer	-0.78	0.56	-1.38	0.17	-1.88	0.33	10.05
hdd_c:C(B10_washing, Treatment(reference=1))[T.0]	Does not have washing machine	0.86	0.56	1.53	0.13	-0.24	1.95	10.42
hdd_c:C(B10_dryer, Treatment(reference=0))[T.1]	Has tumble dryer	0.08	0.17	0.46	0.64	-0.25	0.40	3.06
hdd_c:C(B10_laptop, Treatment(reference=1))[T.0]	Does not have laptop or computer	-0.50	0.26	-1.92	0.06	-1.01	0.01	1.43

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hdd_c:C(B10_tv, Treatment(reference=1))[T.0]	Does not have TV	0.37	0.37	0.99	0.32	-0.36	1.10	1.24
hdd_c:C(B10_acu, Treatment(reference=0))[T.1]	Has ACU	1.11	0.42	2.64	0.01	0.29	1.93	1.18
hdd_c:C(B10_fan, Treatment(reference=0))[T.1]	Has cooling fan	-0.19	0.15	-1.25	0.21	-0.48	0.11	1.93
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Finding it quite difficult]	Managing financially: Finding it quite difficult vs doing alright	-0.07	0.44	-0.15	0.88	-0.92	0.79	1.34
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Finding it very difficult / prefer not to say / dont know]	Managing financially: Finding it very difficult / prefer not to say / dont know vs doing alright	-0.19	0.39	-0.47	0.64	-0.96	0.58	1.26
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Just about getting by]	Managing financially: Just about getting by vs doing alright	0.30	0.21	1.41	0.16	-0.12	0.72	1.66
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Living comfortably]	Managing financially: Living comfortably vs doing alright	0.30	0.17	1.80	0.07	-0.03	0.62	2.24

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hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1900 to 1929]	Build date: 1900-1929 vs 1950- 1975	1.34	0.25	5.30	0.00	0.84	1.83	1.85
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1930 to 1949]	Build date: 1930-1949 vs 1950- 1975	0.88	0.23	3.85	0.00	0.43	1.33	1.85
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1976 to 1990]	Build date: 1976-1990 vs 1950- 1975	-0.63	0.23	-2.72	0.01	-1.08	-0.18	1.71
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1991 to 2002]	Build date: 1991-2002 vs 1950- 1975	-1.13	0.27	-4.27	0.00	-1.65	-0.61	1.64
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.2003 onwards]	Build date: 2003 onwards vs 1950- 1975	-1.53	0.29	-5.22	0.00	-2.10	-0.95	1.53
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.Before 1900]	Build date: Before 1900 vs 1950-1975	1.33	0.29	4.59	0.00	0.76	1.90	1.77
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.Dont know]	Build date: Don't know vs 1950-1975	0.03	0.43	0.07	0.95	-0.82	0.88	1.46
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Converted house or commercial building]	Converted house or commerci al building vs semi- detached	-0.63	0.53	-1.20	0.23	-1.66	0.40	1.33

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hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Detached]	Detached vs semi-detached	1.02	0.21	4.97	0.00	0.62	1.42	2.97
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Purpose built flat]	Purpose built flat vs semi-detached	-0.44	0.31	-1.44	0.15	-1.04	0.16	2.07
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Terraced]	Terraced vs semi-detached	-0.57	0.19	-2.91	0.00	-0.95	-0.19	2.40
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.<=19.0]	Heating set-point: <=19C vs >20C & <=22C	-0.39	0.20	-1.93	0.05	-0.79	0.01	1.96
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>19.0 & <=20.0]	Heating set-point: >19C & <=20C vs >20C & <=22C	-0.22	0.20	-1.10	0.27	-0.61	0.17	1.88
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>22.0]	Heating set-point: >22C vs >20C & <=22C	0.62	0.27	2.29	0.02	0.09	1.14	1.45
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.Not applicable]	Heating set-point: n/a vs >20C & <=22C	-0.25	0.28	-0.89	0.37	-0.80	0.30	3.43
total_rooms_serl_c	Total no. rooms (centred)	3.79	0.47	8.02	0.00	2.86	4.71	3.58

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bedrooms_c	No. bedrooms (centred)	4.10	0.92	4.47	0.00	2.30	5.89	3.59
occupants_adults_c	No. adult occupants (centred)	5.76	0.72	7.96	0.00	4.34	7.18	1.71
occupants_0_15_c	No. child occupants (centred)	2.94	0.91	3.24	0.00	1.16	4.72	1.73
average_adult_age_c	Avg. adult age (centred)	0.24	0.05	4.75	0.00	0.14	0.34	3.24
education_c	Adults educated (proportion, centred)	0.10	1.31	0.08	0.94	-2.47	2.67	1.51
working_30hr_plus_c	Adults working +30hr (proportion, centred)	1.04	1.71	0.61	0.55	-2.32	4.39	2.31
working_30hr_less_c	Adults working <30hr (proportion, centred)	-0.29	1.42	-0.20	0.84	-3.07	2.49	1.19
solar_radiation_c	Surface solar radiation (centred)	-13.06	0.07	-191.78	0.00	-13.20	-12.93	2.62
hdd_c:total_rooms_serl_c	Total no. rooms (centred)	0.48	0.07	7.30	0.00	0.35	0.60	3.63
hdd_c:bedrooms_c	No. bedrooms (centred)	0.70	0.13	5.53	0.00	0.45	0.95	3.61

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hdd_c:occupants_adults_c	No. adult occupants (centred)	0.39	0.10	3.89	0.00	0.19	0.59	1.72
hdd_c:occupants_0_15_c	No. child occupants (centred)	0.18	0.13	1.41	0.16	-0.07	0.42	1.74
hdd_c:average_adult_age_c	Avg. adult age (centred)	0.02	0.01	2.92	0.00	0.01	0.03	3.23
hdd_c:education_c	Adults educated (proportion, centred)	0.13	0.18	0.70	0.49	-0.23	0.48	1.52
hdd_c:working_30hr_plus_c	Adults working +30hr (proportion, centred)	-0.11	0.24	-0.45	0.66	-0.57	0.36	2.32
hdd_c:working_30hr_less_c	Adults working <30hr (proportion, centred)	-0.13	0.20	-0.65	0.52	-0.51	0.26	1.19
hdd_c:solar_radiation_c	Surface solar radiation (centred)	-1.01	0.02	-61.14	0.00	-1.05	-0.98	2.62
Group Var	327.933	0.72						
Group x hdd_c Cov	39.927	0.09						
hdd_c Var	6.165	0.01						

Table A 3. Regression results using linear mixed effects model with random intercept and hdd slope using basic data and SERL survey data and larger sample (N=1418). Dependent variable total energy consumption per day (kWh/day). Number of observations: 372529. Number of groups: 1418. Min. group size: 45. Max. group size: 560. Mean group size: 262.7.

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Model with basic plus SERL survey (smaller sample)

Variable	Brief description	Coefficient	Standard error	z-score	p-value	95% CI (lower)	95% CI (upper)	VIF
Intercept		48.40	4.14	11.70	0.00	40.29	56.50	
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-3.90	2.72	-1.43	0.15	-9.24	1.43	1.87
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	0.07	2.52	0.03	0.98	-4.87	5.01	1.93
C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	1.85	2.37	0.78	0.44	-2.80	6.50	2.38
C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-3.86	3.17	-1.22	0.22	-10.08	2.36	1.91
C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	-0.36	2.55	-0.14	0.89	-5.36	4.65	2.22
C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-5.67	3.29	-1.72	0.09	-12.12	0.79	2.08
C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-3.25	2.76	-1.18	0.24	-8.67	2.16	1.91
C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	-0.09	3.53	-0.03	0.98	-7.01	6.83	2.05
C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	2.30	2.36	0.97	0.33	-2.33	6.94	2.02
C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	1.65	2.14	0.77	0.44	-2.54	5.83	2.06
C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	3.97	2.03	1.95	0.05	-0.01	7.94	2.34
C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	3.88	2.14	1.81	0.07	-0.32	8.08	2.48
C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	0.36	0.16	2.25	0.02	0.05	0.67	1.88
C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	-0.43	0.16	-2.67	0.01	-0.74	-0.11	1.91
C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	0.75	0.16	4.75	0.00	0.44	1.06	1.90
C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	1.19	0.16	7.52	0.00	0.88	1.50	1.90
C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	2.88	0.16	18.17	0.00	2.57	3.19	1.90

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C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	2.28	0.16	14.30	0.00	1.97	2.59	1.87
C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-0.85	0.47	-1.80	0.07	-1.78	0.08	1.98
C(Collection_method, Treatment(reference="Online"))[T.Postal]	Postal vs online response	0.09	1.51	0.06	0.95	-2.87	3.06	2.17
C(A2, Treatment(reference="Not at all"))[T.A little]	Smart meter effect: A little vs not at all	-3.46	1.71	-2.02	0.04	-6.82	-0.10	1.91
C(A2, Treatment(reference="Not at all"))[T.A lot]	Smart meter effect: A lot vs not at all	0.31	2.82	0.11	0.91	-5.21	5.83	1.61
C(A2, Treatment(reference="Not at all"))[T.Don't know or not applicable (A1: No)]	Smart meter effect: Don't know or n/a	0.64	5.08	0.13	0.90	-9.32	10.60	1.46
C(A2, Treatment(reference="Not at all"))[T.Some]	Smart meter effect: Some vs not at all	0.37	1.98	0.19	0.85	-3.50	4.25	1.72
C(central_heating_serl, Treatment(reference="Gas"))[T.Both]	Central heating: Both fuels vs gas	8.87	4.49	1.98	0.05	0.07	17.68	1.35
C(central_heating_serl, Treatment(reference="Gas"))[T.Electricity]	Central heating: Elec. vs gas	-12.28	5.53	-2.22	0.03	-23.12	-1.43	3.97
C(A4_timer, Treatment(reference=1))[T.0]	No timer heating control	2.17	2.45	0.89	0.38	-2.63	6.97	2.66
C(A4_temp, Treatment(reference=1))[T.0]	No temp. heating control	-1.33	2.78	-0.48	0.63	-6.78	4.12	4.11
C(A4_smart, Treatment(reference=0))[T.1]	Has smart heating control	-2.35	1.99	-1.19	0.24	-6.24	1.54	2.20
C(A4_manual, Treatment(reference=0))[T.1]	Manual heating control only	-4.58	3.77	-1.22	0.22	-11.97	2.80	1.69
C(A6_7_dummy_mains, Treatment(reference=0))[T.1.0]	Has mains powered standalone heaters	-1.10	1.61	-0.69	0.49	-4.25	2.05	2.35
C(A8_use_own, Treatment(reference="None or don't know"))[T.Daily]	Has non-mains powered standalone heaters, used daily	0.70	5.98	0.12	0.91	-11.01	12.42	1.43
C(A8_use_own, Treatment(reference="None or don't know"))[T.Most days]	Has non-mains powered standalone heaters, used most days	7.00	4.85	1.44	0.15	-2.51	16.51	1.33
C(A8_use_own, Treatment(reference="None or don't know"))[T.Rarely or never]	Has non-mains powered standalone heaters, used rarely or never	-0.30	4.25	-0.07	0.94	-8.62	8.02	1.31
C(A8_use_own, Treatment(reference="None or don't know"))[T.Varies]	Has non-mains powered standalone heaters, use varies	-13.54	4.26	-3.18	0.00	-21.88	-5.20	1.26
C(A9_cold, Treatment(reference=1))[T.0]	Does not adjust heating when cold	-1.33	2.99	-0.44	0.66	-7.18	4.53	2.89
C(A9_children, Treatment(reference=0))[T.1]	Adjusts heating for children	0.37	2.12	0.17	0.86	-3.79	4.52	1.84
C(A9_visitors, Treatment(reference=0))[T.1]	Adjusts heating for visitors	-1.88	1.71	-1.10	0.27	-5.22	1.46	1.99
C(A9_pets, Treatment(reference=0))[T.1]	Adjusts heating for pets	0.18	5.02	0.04	0.97	-9.65	10.01	1.23

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C(A9_illness, Treatment(reference=0))[T.1]	Adjusts heating when ill	1.37	1.92	0.71	0.48	-2.39	5.13	1.69
C(A9_wfh, Treatment(reference=0))[T.1]	Adjusts heating when WFH	1.05	1.72	0.62	0.54	-2.31	4.42	2.47
C(A9_none, Treatment(reference=0))[T.1]	Adjusts heating: none of the above	-0.50	4.05	-0.12	0.90	-8.44	7.44	2.82
C(A10_how_often, Treatment(reference="Always"))[T.Never]	Adjusts heating when unoccupied: Never (vs always)	-1.20	2.52	-0.48	0.63	-6.14	3.73	1.56
C(A10_how_often, Treatment(reference="Always"))[T.Not_applicable]	Adjusts heating when unoccupied: n/a (vs always)	-1.93	3.49	-0.55	0.58	-8.78	4.91	1.63
C(A10_how_often, Treatment(reference="Always"))[T.Not_very_often]	Adjusts heating when unoccupied: Not very often (vs always)	0.91	2.09	0.43	0.67	-3.20	5.01	1.63
C(A10_how_often, Treatment(reference="Always"))[T.Quite_often]	Adjusts heating when unoccupied: Quite often (vs always)	0.63	2.33	0.27	0.79	-3.94	5.20	1.55
C(A10_how_often, Treatment(reference="Always"))[T.Very_often]	Adjusts heating when unoccupied: Very often (vs always)	-0.90	2.08	-0.43	0.67	-4.99	3.18	1.67
C(A11, Treatment(reference="No"))[T.Yes]	Living spaces not heated during winter	-2.17	1.49	-1.46	0.15	-5.09	0.75	1.89
C(hot_water_taps, Treatment(reference="Gas"))[T.Electricity or both]	Taps hot water fuel: Electricity or both vs gas	6.82	4.51	1.51	0.13	-2.02	15.66	3.67
C(hot_water_taps, Treatment(reference="Gas"))[T.Neither]	Taps hot water fuel: Neither electricity or gas	-3.76	3.42	-1.10	0.27	-10.46	2.94	9.52
C(hot_water_shower, Treatment(reference="Gas"))[T.Both]	Shower hot water fuel: Both fuels vs gas	2.84	4.06	0.70	0.48	-5.12	10.80	1.60
C(hot_water_shower, Treatment(reference="Gas"))[T.Dont know or neither]	Shower hot water fuel: Don't know or neither vs gas	4.16	3.55	1.17	0.24	-2.80	11.12	8.69
C(hot_water_shower, Treatment(reference="Gas"))[T.Electricity]	Shower hot water fuel: Electricity vs gas	-1.14	2.53	-0.45	0.65	-6.09	3.81	3.21
C(A13_often_lights, Treatment(reference="Always"))[T.Quite often, not very often, not applicable, or never]	How often do you switch off lights: Quite often, not very often, not applicable, or never vs always	5.28	2.49	2.12	0.03	0.40	10.16	1.68
C(A13_often_lights, Treatment(reference="Always"))[T.Very often]	How often do you switch off lights: very often vs always	2.87	1.59	1.81	0.07	-0.24	5.98	2.14
C(A13_often_clothes, Treatment(reference="Very often"))[T.Always]	How often do you put on more clothes when it is cold: Always vs very often	-2.23	1.95	-1.15	0.25	-6.06	1.59	2.03
C(A13_often_clothes, Treatment(reference="Very often"))[T.Never, or not applicable]	How often do you put on more clothes when it is cold: Never or n/a vs very often	11.08	5.18	2.14	0.03	0.92	21.24	1.44

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C(A13_often_clothes, Treatment(reference="Very often"))[T.Not very often]	How often do you put on more clothes when it is cold: Not very often vs very often	-0.55	2.40	-0.23	0.82	-5.25	4.16	1.79
C(A13_often_clothes, Treatment(reference="Very often"))[T.Quite often]	How often do you put on more clothes when it is cold: Quite often vs very often	1.52	1.69	0.90	0.37	-1.80	4.84	2.27
C(A14, Treatment(reference="Some effort"))[T.A great deal of effort]	Effort to limit energy use: A great deal of effort vs some effort	-5.04	1.89	-2.67	0.01	-8.74	-1.34	2.00
C(A14, Treatment(reference="Some effort"))[T.A little effort]	Effort to limit energy use: A little effort vs some effort	-0.11	1.97	-0.06	0.95	-3.98	3.75	1.91
C(A14, Treatment(reference="Some effort"))[T.No effort at all or don't know]	Effort to limit energy use: No effort or don't know vs some effort	1.45	4.31	0.34	0.74	-7.00	9.89	1.41
C(A15_cold, Treatment(reference="Not very often"))[T.Always]	Open windows, cold day: Always vs not very often	7.24	3.52	2.06	0.04	0.34	14.14	1.30
C(A15_cold, Treatment(reference="Not very often"))[T.Never or don't know]	Open windows, cold day: Never or don't know vs not very often	2.78	1.92	1.45	0.15	-0.98	6.55	2.00
C(A15_cold, Treatment(reference="Not very often"))[T.Quite often]	Open windows, cold day: Quite often vs not very often	1.98	1.96	1.01	0.31	-1.86	5.83	1.83
C(A15_cold, Treatment(reference="Not very often"))[T.Very often]	Open windows, cold day: Very often vs not very often	4.10	3.15	1.30	0.19	-2.07	10.28	1.39
C(A15_warm, Treatment(reference="Always"))[T.Not very often or never]	Open windows, warm day: Not very often or never vs always	7.75	4.07	1.91	0.06	-0.22	15.72	1.41
C(A15_warm, Treatment(reference="Always"))[T.Quite often]	Open windows, warm day: Quite often or never vs always	-3.34	2.94	-1.14	0.26	-9.10	2.43	1.50
C(A15_warm, Treatment(reference="Always"))[T.Very often]	Open windows, warm day: Very often or never vs always	0.35	1.64	0.21	0.83	-2.86	3.56	2.00
C(A16_no, Treatment(reference=1))[T.0.0]	Considering changes to heating or energy supply in 12 months	-3.48	4.12	-0.85	0.40	-11.55	4.59	8.19
C(A16_na, Treatment(reference=0))[T.1.0]	Considering changes to heating or energy supply in 12 months: n/a	6.68	5.20	1.28	0.20	-3.51	16.87	4.74
C(A16_gas_boiler, Treatment(reference=0))[T.1.0]	Considering gas boiler	6.93	4.69	1.48	0.14	-2.25	16.12	3.09
C(A16_pv, Treatment(reference=0))[T.1.0]	Considering solar PV	6.68	4.68	1.43	0.15	-2.49	15.84	1.89
C(A16_wood_burner, Treatment(reference=0))[T.1.0]	Considering wood burner	-12.08	6.59	-1.83	0.07	-25.00	0.84	1.95
C(B4, Treatment(reference="Own / part-own"))[T.Private rental]	Private rental vs owner/part-owner	-1.46	2.67	-0.55	0.58	-6.69	3.76	2.01

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C(B4, Treatment(reference="Own / part-own"))[T.Social rental / rent free]	Social rental / rent free vs owner/part-owner	-2.12	3.30	-0.64	0.52	-8.59	4.35	2.14
C(B7_keepwarm, Treatment(reference="Yes"))[T.No or don't know]	Cannot keep warm in winter or don't know	3.16	2.96	1.07	0.29	-2.65	8.96	1.47
C(B8_damp, Treatment(reference="No"))[T.Dont_know]	Problem with damp: don't know vs no	-0.52	4.95	-0.11	0.92	-10.21	9.18	1.24
C(B8_damp, Treatment(reference="No"))[T.Yes]	Problem with damp: Yes vs no	1.33	1.82	0.73	0.47	-2.24	4.90	1.96
C(B10_elec_oven, Treatment(reference=1))[T.0]	Does not have electric oven	-7.42	3.60	-2.06	0.04	-14.48	-0.36	5.34
C(B10_gas_oven, Treatment(reference=0))[T.1]	Has gas oven	6.93	3.51	1.98	0.05	0.06	13.80	5.71
C(B10_elec_hob, Treatment(reference=0))[T.1]	Has electric hob	1.15	2.80	0.41	0.68	-4.33	6.63	7.52
C(B10_gas_hob, Treatment(reference=1))[T.0]	Does not have gas hob	-1.39	2.65	-0.53	0.60	-6.58	3.80	8.27
C(B10_dish, Treatment(reference=1))[T.0]	Does not have dishwasher	-2.15	1.76	-1.22	0.22	-5.60	1.30	3.06
C(B10_fridge, Treatment(reference=1))[T.0]	Does not have fridge	-5.07	4.37	-1.16	0.25	-13.64	3.50	1.41
C(B10_freezer, Treatment(reference=0))[T.1]	Has standalone freezer	-0.18	1.55	-0.12	0.91	-3.22	2.85	2.07
C(B10_combined_wash, Treatment(reference=0))[T.1]	Has combined clothes washer dryer	-5.50	4.74	-1.16	0.25	-14.79	3.80	9.30
C(B10_washing, Treatment(reference=1))[T.0]	Does not have washing machine	5.43	4.64	1.17	0.24	-3.67	14.53	9.87
C(B10_dryer, Treatment(reference=0))[T.1]	Has tumble dryer	-0.73	1.67	-0.44	0.66	-4.01	2.55	3.42
C(B10_laptop, Treatment(reference=1))[T.0]	Does not have laptop or computer	-4.20	2.61	-1.61	0.11	-9.31	0.91	1.50
C(B10_tv, Treatment(reference=1))[T.0]	Does not have TV	-3.62	4.06	-0.89	0.37	-11.58	4.34	1.36
C(B10_acu, Treatment(reference=0))[T.1]	Has ACU	11.22	4.37	2.57	0.01	2.65	19.78	1.30
C(B10_fan, Treatment(reference=0))[T.1]	Has cooling fan	1.92	1.43	1.34	0.18	-0.89	4.73	2.19
C(D4, Treatment(reference="Doing alright"))[T.Finding it quite difficult]	Managing financially: Finding it quite difficult vs doing alright	5.23	4.53	1.15	0.25	-3.66	14.11	1.47
C(D4, Treatment(reference="Doing alright"))[T.Finding it very difficult / prefer not to say / dont know]	Managing financially: Finding it very difficult / prefer not to say / dont know vs doing alright	1.52	4.20	0.36	0.72	-6.72	9.76	1.37
C(D4, Treatment(reference="Doing alright"))[T.Just about getting by]	Managing financially: Just about getting by vs doing alright	-1.18	1.99	-0.59	0.55	-5.08	2.72	1.96
C(D4, Treatment(reference="Doing alright"))[T.Living comfortably]	Managing financially: Living comfortably vs doing alright	-0.57	1.66	-0.35	0.73	-3.82	2.67	2.37

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C(B9, Treatment(reference="1950 to 1975"))[T.1900 to 1929]	Build date: 1900-1929 vs 1950-1975	9.76	2.46	3.97	0.00	4.94	14.57	2.04
C(B9, Treatment(reference="1950 to 1975"))[T.1930 to 1949]	Build date: 1930-1949 vs 1950-1975	0.93	2.30	0.41	0.69	-3.57	5.44	1.93
C(B9, Treatment(reference="1950 to 1975"))[T.1976 to 1990]	Build date: 1976-1990 vs 1950-1975	-5.35	2.22	-2.41	0.02	-9.70	-1.00	1.84
C(B9, Treatment(reference="1950 to 1975"))[T.1991 to 2002]	Build date: 1991-2002 vs 1950-1975	-6.43	2.55	-2.52	0.01	-11.42	-1.44	1.80
C(B9, Treatment(reference="1950 to 1975"))[T.2003 onwards]	Build date: 2003 onwards vs 1950-1975	-7.07	3.01	-2.35	0.02	-12.96	-1.17	1.57
C(B9, Treatment(reference="1950 to 1975"))[T.Before 1900]	Build date: Before 1900 vs 1950-1975	7.89	2.94	2.68	0.01	2.13	13.66	2.08
C(B9, Treatment(reference="1950 to 1975"))[T.Dont know]	Build date: Don't know vs 1950-1975	2.22	3.99	0.56	0.58	-5.61	10.04	1.76
C(B1, Treatment(reference="Semi detached"))[T.Converted house or commercial building]	Converted house or commercial building vs semi-detached	-1.79	4.84	-0.37	0.71	-11.27	7.70	1.53
C(B1, Treatment(reference="Semi detached"))[T.Detached]	Detached vs semi-detached	5.28	2.06	2.56	0.01	1.23	9.32	2.93
C(B1, Treatment(reference="Semi detached"))[T.Purpose built flat]	Purpose built flat vs semi-detached	-6.39	2.85	-2.24	0.03	-11.98	-0.79	2.42
C(B1, Treatment(reference="Semi detached"))[T.Terraced]	Terraced vs semi-detached	-6.31	1.88	-3.35	0.00	-10.00	-2.62	2.63
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.<=19.0]	Heating set-point: <=19C vs >20C & <=22C	-6.47	2.00	-3.23	0.00	-10.39	-2.54	2.06
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>19.0 & <=20.0]	Heating set-point: >19C & <=20C vs >20C & <=22C	-4.06	1.93	-2.10	0.04	-7.85	-0.27	2.01
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>22.0]	Heating set-point: >22C vs >20C & <=22C	2.69	2.66	1.01	0.31	-2.52	7.89	1.52
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.Not applicable]	Heating set-point: n/a vs >20C & <=22C	-4.22	2.85	-1.48	0.14	-9.80	1.36	3.81
hdd_c	Heating degree days (centred)	5.46	0.59	9.27	0.00	4.31	6.62	52.73
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-0.41	0.39	-1.05	0.30	-1.17	0.35	2.04

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hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	0.11	0.36	0.31	0.76	-0.59	0.81	2.09
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	0.29	0.34	0.86	0.39	-0.37	0.95	2.64
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-0.66	0.45	-1.45	0.15	-1.55	0.23	1.97
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	0.27	0.36	0.75	0.45	-0.44	0.99	2.28
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-0.52	0.47	-1.11	0.27	-1.44	0.40	2.10
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-0.07	0.39	-0.16	0.87	-0.84	0.71	2.05
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	0.07	0.51	0.14	0.89	-0.92	1.06	2.19
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	0.51	0.34	1.51	0.13	-0.15	1.17	2.10
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	0.01	0.30	0.02	0.98	-0.59	0.60	2.11
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	0.60	0.29	2.08	0.04	0.03	1.17	2.51
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	0.69	0.31	2.25	0.02	0.09	1.29	2.82
hdd_c:C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	-0.08	0.04	-1.92	0.06	-0.16	0.00	2.12
hdd_c:C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	0.03	0.04	0.84	0.40	-0.05	0.11	2.14
hdd_c:C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	-0.23	0.04	-5.58	0.00	-0.31	-0.15	2.03
hdd_c:C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	-0.07	0.04	-1.57	0.12	-0.15	0.02	2.00
hdd_c:C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	0.06	0.04	1.39	0.16	-0.02	0.14	1.96
hdd_c:C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	0.10	0.04	2.26	0.02	0.01	0.18	1.93
hdd_c:C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-1.51	0.12	-	0.00	-1.74	-1.28	2.02
				12.76				
hdd_c:C(Collection_method, Treatment(reference="Online"))[T.Postal]	Postal vs online response	-0.01	0.22	-0.02	0.98	-0.43	0.42	2.25
hdd_c:C(A2, Treatment(reference="Not at all"))[T.A little]	Smart meter effect: A little vs not at all	-0.41	0.24	-1.68	0.09	-0.89	0.07	2.01
hdd_c:C(A2, Treatment(reference="Not at all"))[T.A lot]	Smart meter effect: A lot vs not at all	0.13	0.40	0.31	0.75	-0.66	0.91	1.61

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hdd_c:C(A2, Treatment(reference="Not at all"))[T.Don't know or not applicable (A1: No)]	Smart meter effect: Don't know or n/a	-0.32	0.72	-0.45	0.66	-1.74	1.09	1.47
hdd_c:C(A2, Treatment(reference="Not at all"))[T.Some]	Smart meter effect: Some vs not at all	0.04	0.28	0.15	0.88	-0.51	0.59	1.73
hdd_c:C(central_heating_serl, Treatment(reference="Gas"))[T.Both]	Central heating: Both fuels vs gas	1.16	0.64	1.82	0.07	-0.09	2.41	1.37
hdd_c:C(central_heating_serl, Treatment(reference="Gas"))[T.Electricity]	Central heating: Elec. vs gas	-1.17	0.79	-1.48	0.14	-2.71	0.38	3.96
hdd_c:C(A4_timer, Treatment(reference=1))[T.0]	No timer heating control	0.30	0.35	0.85	0.40	-0.39	0.98	2.64
hdd_c:C(A4_temp, Treatment(reference=1))[T.0]	No temp. heating control	0.07	0.40	0.17	0.86	-0.71	0.85	4.14
hdd_c:C(A4_smart, Treatment(reference=0))[T.1]	Has smart heating control	-0.61	0.28	-2.17	0.03	-1.17	-0.06	2.19
hdd_c:C(A4_manual, Treatment(reference=0))[T.1]	Manual heating control only	-0.53	0.54	-0.98	0.33	-1.58	0.53	1.67
hdd_c:C(A6_7_dummy_mains, Treatment(reference=0))[T.1.0]	Has mains powered standalone heaters	-0.25	0.23	-1.08	0.28	-0.70	0.20	2.40
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Daily]	Has non-mains powered standalone heaters, used daily	-0.10	0.85	-0.11	0.91	-1.77	1.57	1.44
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Most days]	Has non-mains powered standalone heaters, used most days	1.28	0.69	1.86	0.06	-0.07	2.64	1.34
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Rarely or never]	Has non-mains powered standalone heaters, used rarely or never	0.01	0.60	0.01	0.99	-1.18	1.19	1.35
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Varies]	Has non-mains powered standalone heaters, use varies	-1.51	0.61	-2.49	0.01	-2.70	-0.32	1.28
hdd_c:C(A9_cold, Treatment(reference=1))[T.0]	Does not adjust heating when cold	-0.30	0.43	-0.70	0.48	-1.13	0.54	2.91
hdd_c:C(A9_children, Treatment(reference=0))[T.1]	Adjusts heating for children	0.09	0.30	0.29	0.77	-0.50	0.68	1.91
hdd_c:C(A9_visitors, Treatment(reference=0))[T.1]	Adjusts heating for visitors	-0.48	0.24	-1.96	0.05	-0.95	0.00	1.99
hdd_c:C(A9_pets, Treatment(reference=0))[T.1]	Adjusts heating for pets	-0.21	0.72	-0.30	0.77	-1.61	1.19	1.22
hdd_c:C(A9_illness, Treatment(reference=0))[T.1]	Adjusts heating when ill	0.23	0.27	0.84	0.40	-0.31	0.77	1.71
hdd_c:C(A9_wfh, Treatment(reference=0))[T.1]	Adjusts heating when WFH	0.13	0.24	0.52	0.60	-0.35	0.61	2.56
hdd_c:C(A9_none, Treatment(reference=0))[T.1]	Adjusts heating: none of the above	0.15	0.58	0.26	0.79	-0.98	1.28	2.84
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Never]	Adjusts heating when unoccupied: Never (vs always)	-0.29	0.36	-0.81	0.42	-0.99	0.41	1.61

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hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Not_applicable]	Adjusts heating when unoccupied: n/a (vs always)	-0.74	0.50	-1.50	0.14	-1.72	0.23	1.62
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Not_very_often]	Adjusts heating when unoccupied: Not very often (vs always)	-0.10	0.30	-0.33	0.74	-0.68	0.49	1.67
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Quite_often]	Adjusts heating when unoccupied: Quite often (vs always)	-0.04	0.33	-0.11	0.92	-0.69	0.62	1.57
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Very_often]	Adjusts heating when unoccupied: Very often (vs always)	-0.32	0.30	-1.08	0.28	-0.90	0.26	1.71
hdd_c:C(A11, Treatment(reference="No"))[T.Yes]	Living spaces not heated during winter	-0.32	0.21	-1.53	0.13	-0.74	0.09	1.91
hdd_c:C(hot_water_taps, Treatment(reference="Gas"))[T.Electricity or both]	Taps hot water fuel: Electricity or both vs gas	0.44	0.64	0.68	0.49	-0.82	1.70	3.62
hdd_c:C(hot_water_taps, Treatment(reference="Gas"))[T.Neither]	Taps hot water fuel: Neither electricity or gas	-0.30	0.49	-0.62	0.53	-1.26	0.65	9.27
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Both]	Shower hot water fuel: Both fuels vs gas	0.79	0.58	1.36	0.17	-0.35	1.92	1.60
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Dont know or neither]	Shower hot water fuel: Don't know or neither vs gas	0.50	0.51	0.98	0.33	-0.50	1.49	8.42
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Electricity]	Shower hot water fuel: Electricity vs gas	-0.10	0.36	-0.28	0.78	-0.80	0.61	3.22
hdd_c:C(A13_often_lights, Treatment(reference="Always"))[T.Quite often, not very often, not applicable, or never]	How often do you switch off lights: Quite often, not very often, not applicable, or never vs always	0.38	0.36	1.06	0.29	-0.32	1.07	1.66
hdd_c:C(A13_often_lights, Treatment(reference="Always"))[T.Very often]	How often do you switch off lights: very often vs always	0.26	0.23	1.16	0.25	-0.18	0.71	2.19
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Always]	How often do you put on more clothes when it is cold: Always vs very often	-0.30	0.28	-1.07	0.29	-0.84	0.25	2.06
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Never, or not applicable]	How often do you put on more clothes when it is cold: Never or n/a vs very often	2.12	0.74	2.87	0.00	0.67	3.56	1.47
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Not very often]	How often do you put on more clothes when it is cold: Not very often vs very often	-0.37	0.34	-1.07	0.29	-1.04	0.30	1.84
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Quite often]	How often do you put on more clothes when it is cold: Quite often vs very often	0.24	0.24	1.00	0.32	-0.23	0.71	2.30

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hdd_c:C(A14, Treatment(reference="Some effort"))[T.A great deal of effort]	Effort to limit energy use: A great deal of effort vs some effort	-0.70	0.27	-2.59	0.01	-1.23	-0.17	2.03
hdd_c:C(A14, Treatment(reference="Some effort"))[T.A little effort]	Effort to limit energy use: A little effort vs some effort	-0.04	0.28	-0.14	0.89	-0.59	0.51	1.93
hdd_c:C(A14, Treatment(reference="Some effort"))[T.No effort at all or don't know]	Effort to limit energy use: No effort or don't know vs some effort	0.21	0.61	0.34	0.73	-0.99	1.41	1.43
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Always]	Open windows, cold day: Always vs not very often	0.57	0.50	1.13	0.26	-0.42	1.55	1.29
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Never or don't know]	Open windows, cold day: Never or don't know vs not very often	0.38	0.27	1.38	0.17	-0.16	0.92	2.02
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Quite often]	Open windows, cold day: Quite often vs not very often	0.28	0.28	0.99	0.32	-0.27	0.83	1.82
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Very often]	Open windows, cold day: Very often vs not very often	0.48	0.45	1.08	0.28	-0.40	1.36	1.40
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Not very often or never]	Open windows, warm day: Not very often or never vs always	0.69	0.58	1.19	0.24	-0.45	1.82	1.43
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Quite often]	Open windows, warm day: Quite often or never vs always	-0.01	0.42	-0.02	0.98	-0.83	0.81	1.52
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Very often]	Open windows, warm day: Very often or never vs always	0.08	0.23	0.34	0.73	-0.38	0.54	2.09
hdd_c:C(A16_no, Treatment(reference=1))[T.0.0]	Considering changes to heating or energy supply in 12 months	-0.64	0.59	-1.10	0.27	-1.79	0.51	8.22
hdd_c:C(A16_na, Treatment(reference=0))[T.1.0]	Considering changes to heating or energy supply in 12 months: n/a	1.03	0.74	1.38	0.17	-0.43	2.48	4.69
hdd_c:C(A16_gas_boiler, Treatment(reference=0))[T.1.0]	Considering gas boiler	1.19	0.67	1.78	0.07	-0.12	2.50	3.09
hdd_c:C(A16_pv, Treatment(reference=0))[T.1.0]	Considering solar PV	0.61	0.67	0.92	0.36	-0.69	1.92	1.89
hdd_c:C(A16_wood_burner, Treatment(reference=0))[T.1.0]	Considering wood burner	-1.29	0.94	-1.37	0.17	-3.13	0.55	1.93
hdd_c:C(B4, Treatment(reference="Own / part-own"))[T.Private rental]	Private rental vs owner/part-owner	0.00	0.38	0.00	1.00	-0.75	0.74	2.06
hdd_c:C(B4, Treatment(reference="Own / part-own"))[T.Social rental / rent free]	Social rental / rent free vs owner/part-owner	-0.37	0.47	-0.78	0.43	-1.29	0.55	2.15

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hdd_c:C(B7_keepwarm, Treatment(reference="Yes"))[T.No or don't know]	Cannot keep warm in winter or don't know	0.58	0.42	1.38	0.17	-0.25	1.41	1.47
hdd_c:C(B8_damp, Treatment(reference="No"))[T.Dont_know]	Problem with damp: don't know vs no	0.34	0.71	0.49	0.63	-1.04	1.73	1.26
hdd_c:C(B8_damp, Treatment(reference="No"))[T.Yes]	Problem with damp: Yes vs no	0.08	0.26	0.32	0.75	-0.43	0.59	1.95
hdd_c:C(B10_elec_oven, Treatment(reference=1))[T.0]	Does not have electric oven	-1.02	0.51	-1.98	0.05	-2.02	-0.01	5.31
hdd_c:C(B10_gas_oven, Treatment(reference=0))[T.1]	Has gas oven	0.88	0.50	1.76	0.08	-0.10	1.86	5.66
hdd_c:C(B10_elec_hob, Treatment(reference=0))[T.1]	Has electric hob	0.31	0.40	0.77	0.44	-0.48	1.09	7.68
hdd_c:C(B10_gas_hob, Treatment(reference=1))[T.0]	Does not have gas hob	-0.15	0.38	-0.41	0.69	-0.89	0.59	8.38
hdd_c:C(B10_dish, Treatment(reference=1))[T.0]	Does not have dishwasher	-0.35	0.25	-1.39	0.17	-0.84	0.14	3.24
hdd_c:C(B10_fridge, Treatment(reference=1))[T.0]	Does not have fridge	-0.85	0.62	-1.36	0.17	-2.07	0.37	1.41
hdd_c:C(B10_freezer, Treatment(reference=0))[T.1]	Has standalone freezer	0.05	0.22	0.21	0.83	-0.39	0.48	2.12
hdd_c:C(B10_combined_wash, Treatment(reference=0))[T.1]	Has combined clothes washer dryer	-1.36	0.68	-2.00	0.05	-2.68	-0.03	9.35
hdd_c:C(B10_washing, Treatment(reference=1))[T.0]	Does not have washing machine	1.07	0.66	1.62	0.11	-0.23	2.37	9.84
hdd_c:C(B10_dryer, Treatment(reference=0))[T.1]	Has tumble dryer	-0.27	0.24	-1.13	0.26	-0.74	0.20	3.57
hdd_c:C(B10_laptop, Treatment(reference=1))[T.0]	Does not have laptop or computer	-0.51	0.37	-1.38	0.17	-1.24	0.22	1.50
hdd_c:C(B10_tv, Treatment(reference=1))[T.0]	Does not have TV	-0.49	0.58	-0.84	0.40	-1.62	0.65	1.39
hdd_c:C(B10_acu, Treatment(reference=0))[T.1]	Has ACU	0.86	0.62	1.37	0.17	-0.37	2.08	1.33
hdd_c:C(B10_fan, Treatment(reference=0))[T.1]	Has cooling fan	0.11	0.20	0.53	0.60	-0.29	0.51	2.25
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Finding it quite difficult]	Managing financially: Finding it quite difficult vs doing alright	0.61	0.65	0.94	0.35	-0.66	1.87	1.49
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Finding it very difficult / prefer not to say / dont know]	Managing financially: Finding it very difficult / prefer not to say / dont know vs doing alright	-0.48	0.60	-0.80	0.43	-1.65	0.70	1.35
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Just about getting by]	Managing financially: Just about getting by vs doing alright	-0.05	0.28	-0.18	0.86	-0.61	0.51	1.97

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hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Living comfortably]	Managing financially: Living comfortably vs doing alright	0.18	0.24	0.76	0.45	-0.28	0.64	2.44
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1900 to 1929]	Build date: 1900-1929 vs 1950-1975	1.32	0.35	3.76	0.00	0.63	2.00	2.13
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1930 to 1949]	Build date: 1930-1949 vs 1950-1975	0.32	0.33	0.98	0.33	-0.32	0.96	1.97
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1976 to 1990]	Build date: 1976-1990 vs 1950-1975	-0.78	0.32	-2.48	0.01	-1.40	-0.16	1.91
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1991 to 2002]	Build date: 1991-2002 vs 1950-1975	-1.34	0.36	-3.69	0.00	-2.05	-0.63	1.84
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.2003 onwards]	Build date: 2003 onwards vs 1950-1975	-1.11	0.43	-2.58	0.01	-1.95	-0.27	1.62
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.Before 1900]	Build date: Before 1900 vs 1950-1975	1.05	0.42	2.51	0.01	0.23	1.87	2.11
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.Dont know]	Build date: Don't know vs 1950-1975	0.00	0.57	0.00	1.00	-1.12	1.12	1.76
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Converted house or commercial building]	Converted house or commercial building vs semi-detached	-0.60	0.69	-0.87	0.38	-1.96	0.75	1.56
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Detached]	Detached vs semi-detached	1.00	0.29	3.39	0.00	0.42	1.57	3.10
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Purpose built flat]	Purpose built flat vs semi-detached	-0.88	0.41	-2.16	0.03	-1.68	-0.08	2.62
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Terraced]	Terraced vs semi-detached	-0.73	0.27	-2.70	0.01	-1.25	-0.20	2.78
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.<=19.0]	Heating set-point: <=19C vs >20C & <=22C	-0.49	0.29	-1.73	0.08	-1.05	0.07	2.11
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>19.0 & <=20.0]	Heating set-point: >19C & <=20C vs >20C & <=22C	-0.36	0.28	-1.30	0.19	-0.90	0.18	2.07
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>22.0]	Heating set-point: >22C vs >20C & <=22C	-0.05	0.38	-0.13	0.90	-0.79	0.69	1.56
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.Not applicable]	Heating set-point: n/a vs >20C & <=22C	-0.83	0.41	-2.04	0.04	-1.62	-0.03	3.92
total_rooms_serl_c	Total no. rooms (centred)	4.08	0.59	6.94	0.00	2.93	5.23	3.62
bedrooms_c	No. bedrooms (centred)	3.97	1.20	3.31	0.00	1.62	6.32	3.91

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occupants_adults_c	No. adult occupants (centred)	6.08	0.98	6.22	0.00	4.16	7.99	1.91
occupants_0_15_c	No. child occupants (centred)	3.47	1.12	3.11	0.00	1.28	5.65	2.11
average_adult_age_c	Avg. adult age (centred)	0.24	0.07	3.59	0.00	0.11	0.37	3.23
education_c	Adults educated (proportion, centred)	-2.26	1.78	-1.27	0.20	-5.74	1.22	1.70
working_30hr_plus_c	Adults working +30hr (proportion, centred)	2.39	2.29	1.04	0.30	-2.10	6.87	2.79
working_30hr_less_c	Adults working <30hr (proportion, centred)	-2.90	3.40	-0.85	0.39	-9.57	3.76	1.56
solar_radiation_c	Surface solar radiation (centred)	-12.30	0.10	-	0.00	-12.49	-12.11	2.58
				127.8				
				7				
hdd_c:total_rooms_serl_c	Total no. rooms (centred)	0.47	0.08	5.64	0.00	0.31	0.64	3.62
hdd_c:bedrooms_c	No. bedrooms (centred)	0.82	0.17	4.77	0.00	0.48	1.15	3.91
hdd_c:occupants_adults_c	No. adult occupants (centred)	0.42	0.14	3.00	0.00	0.14	0.69	1.94
hdd_c:occupants_0_15_c	No. child occupants (centred)	0.21	0.16	1.32	0.19	-0.10	0.52	2.15
hdd_c:average_adult_age_c	Avg. adult age (centred)	0.02	0.01	1.88	0.06	0.00	0.04	3.22
hdd_c:education_c	Adults educated (proportion, centred)	-0.22	0.25	-0.85	0.40	-0.71	0.28	1.71
hdd_c:working_30hr_plus_c	Adults working +30hr (proportion, centred)	-0.03	0.33	-0.09	0.93	-0.67	0.61	2.80
hdd_c:working_30hr_less_c	Adults working <30hr (proportion, centred)	-0.56	0.48	-1.15	0.25	-1.51	0.39	1.54
hdd_c:solar_radiation_c	Surface solar radiation (centred)	-0.98	0.02	-	0.00	-1.03	-0.93	2.56
				41.48				
Group Var		265.96	0.88					
Group x hdd_c Cov		32.88	0.12					
hdd_c Var		5.32	0.02					

Table A 4. Regression results using linear mixed effects model with random intercept and hdd slope using basic data and SERL survey data and smaller sample (N=682). Dependent variable total energy consumption per day (kWh/day). Number of observations: 181742. Number of groups: 682. Min. group size: 53. Max. group size: 560. Mean group size: 266.5.

Model with all data

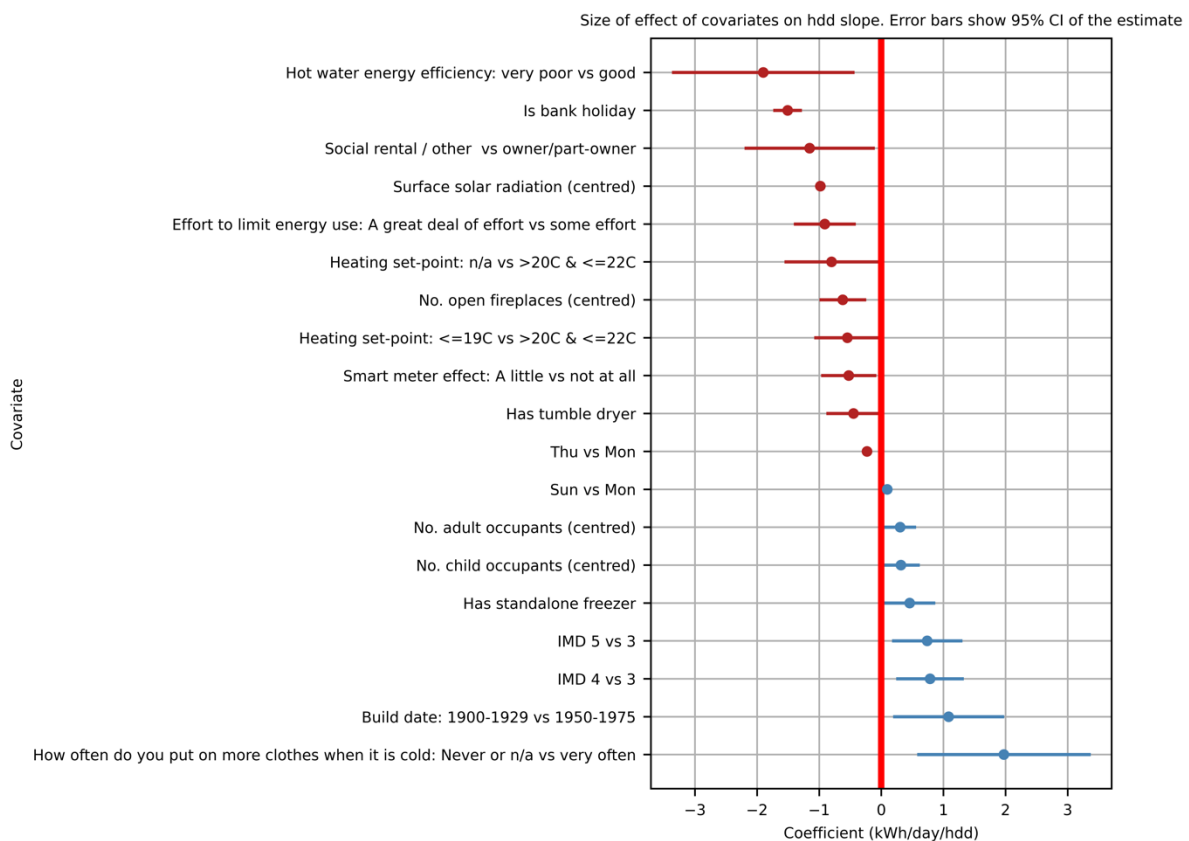
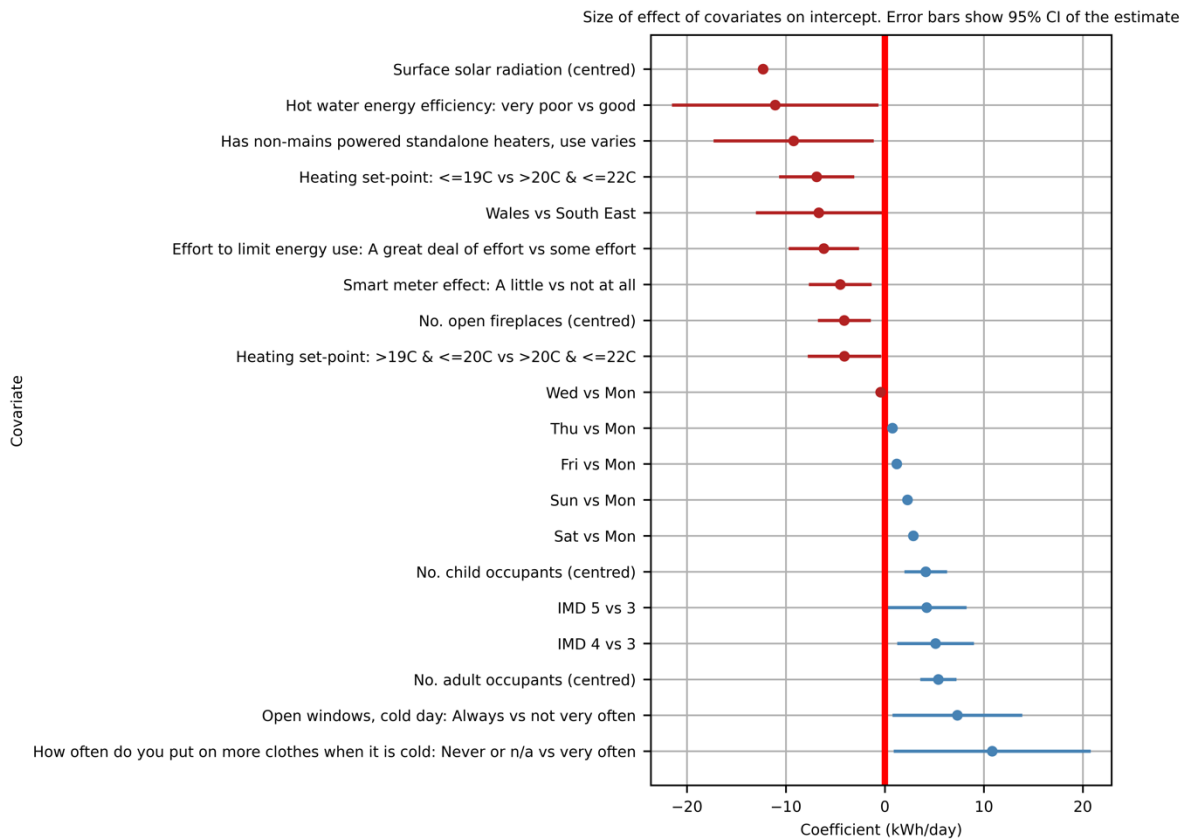


Figure A 3. Size of coefficients for statistically significant ($p < 0.05$) and low VIF (< 5) variables for the All data model and smaller sample ($N=682$), showing the variables with up to the ten largest positive and negative effects on intercept (upper)

and hdd slope (lower). Those with negative effect are shown in red, those with positive effect shown in blue. Error bars show 95% confidence interval of the estimate.

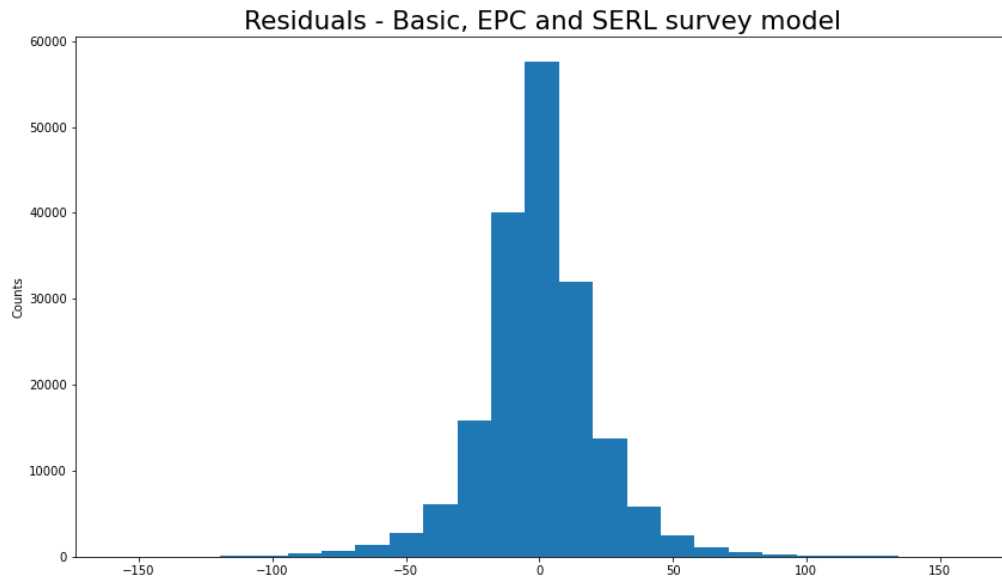


Figure A 4. Histogram of residuals of All Data model applied to smaller sample (N=682) showing approximately normal distribution.

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Variable	Description	Coefficient	Standard error	z-score	p-value	95% CI (lower)	95% CI (upper)	VIF
Intercept		50.00	5.87	8.51	0.00	38.49	61.51	
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-3.02	2.66	-1.13	0.26	-8.23	2.20	2.23
C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	-0.70	2.47	-0.28	0.78	-5.54	4.14	2.26
C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	1.44	2.47	0.58	0.56	-3.40	6.28	3.10
C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-3.98	3.06	-1.30	0.19	-9.99	2.02	2.12
C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	0.94	2.50	0.37	0.71	-3.97	5.85	2.71
C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-6.68	3.25	-2.06	0.04	-13.04	-0.31	2.53
C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-3.85	2.73	-1.41	0.16	-9.21	1.51	2.31
C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	0.02	3.45	0.01	1.00	-6.75	6.79	2.24
C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	1.96	2.28	0.86	0.39	-2.50	6.43	2.28
C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	2.74	2.02	1.35	0.18	-1.23	6.70	2.31
C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	5.12	1.98	2.59	0.01	1.24	9.00	2.83
C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	4.22	2.06	2.05	0.04	0.18	8.25	2.96
C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	0.36	0.16	2.26	0.02	0.05	0.67	1.95

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C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	-0.43	0.16	-2.67	0.01	-0.74	-0.11	1.99
C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	0.75	0.16	4.75	0.00	0.44	1.06	1.97
C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	1.19	0.16	7.52	0.00	0.88	1.50	1.97
C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	2.88	0.16	18.17	0.00	2.57	3.19	1.98
C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	2.28	0.16	14.30	0.00	1.97	2.59	1.95
C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-0.86	0.47	-1.80	0.07	-1.79	0.08	1.98
C(secondheatDescription, Treatment(reference="None"))[T.Portable electric/assumed]	Has Portable electric/assumed	1.66	5.34	0.31	0.76	-8.81	12.13	1.99
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, electric]	Has Room heaters, electric	-3.30	2.14	-1.54	0.12	-7.50	0.91	2.28
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, mains gas]	Has Room heaters, mains gas	-1.52	1.86	-0.82	0.41	-5.16	2.12	3.25
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, solid fuel]	Has Room heaters, solid fuel	-0.60	3.54	-0.17	0.87	-7.53	6.33	1.86
C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, wood logs]	Has Room heaters, wood logs	-4.24	4.04	-1.05	0.29	-12.16	3.67	1.68
C(Collection_method, Treatment(reference="Online"))[T.Postal]	Postal vs online response	0.53	1.46	0.37	0.71	-2.33	3.39	2.53
C(A2, Treatment(reference="Not at all"))[T.A little]	Smart meter effect: A little vs not at all	-4.52	1.62	-2.79	0.01	-7.68	-1.35	2.11

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C(A2, Treatment(reference="Not at all"))[T.A lot]	Smart meter effect: A lot vs not at all	-0.30	2.70	-0.11	0.91	-5.59	4.99	1.76
C(A2, Treatment(reference="Not at all"))[T.Don't know or not applicable (A1: No)]	Smart meter effect: Don't know or n/a	-2.22	4.85	-0.46	0.65	-11.73	7.29	1.64
C(A2, Treatment(reference="Not at all"))[T.Some]	Smart meter effect: Some vs not at all	0.18	1.92	0.10	0.92	-3.59	3.96	2.00
C(central_heating_combined, Treatment(reference="Gas/Gas"))[T.Both]	Central heating: Both fuels vs gas	6.32	3.91	1.62	0.11	-1.35	13.98	1.68
C(central_heating_combined, Treatment(reference="Gas/Gas"))[T.Electricity/Electricity]	Central heating: Elec. vs gas	-9.87	7.00	-1.41	0.16	-23.59	3.85	7.66
C(A4_timer, Treatment(reference=1))[T.0]	No timer heating control	3.53	2.40	1.47	0.14	-1.17	8.23	3.08
C(A4_temp, Treatment(reference=1))[T.0]	No temp. heating control	-1.63	2.73	-0.60	0.55	-6.99	3.72	4.91
C(A4_smart, Treatment(reference=0))[T.1]	Has smart heating control	-1.74	1.91	-0.91	0.36	-5.48	2.01	2.47
C(A4_manual, Treatment(reference=0))[T.1]	Manual heating	-4.20	3.72	-1.13	0.26	-11.49	3.09	2.01

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	control only							
C(A6_7_dummy_mains, Treatment(reference=0))[T.1.0]	Has mains powered standalone heaters	-1.57	1.56	-1.01	0.32	-4.62	1.49	2.66
C(A8_use_own, Treatment(reference="None or don't know"))[T.Daily]	Has non-mains powered standalone heaters, used daily	-0.40	5.75	-0.07	0.95	-11.67	10.88	1.60
C(A8_use_own, Treatment(reference="None or don't know"))[T.Most days]	Has non-mains powered standalone heaters, used most days	3.37	4.83	0.70	0.49	-6.10	12.84	1.59
C(A8_use_own, Treatment(reference="None or don't know"))[T.Rarely or never]	Has non-mains powered standalone heaters, used rarely or never	-0.75	4.15	-0.18	0.86	-8.88	7.37	1.55
C(A8_use_own, Treatment(reference="None or don't know"))[T.Varies]	Has non-mains powered standalone heaters, use varies	-9.23	4.13	-2.24	0.03	-17.32	-1.14	1.42
C(A9_cold, Treatment(reference=1))[T.0]	Does not adjust	-3.46	2.93	-1.18	0.24	-9.21	2.28	3.40

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	heating when cold							
C(A9_children, Treatment(reference=0))[T.1]	Adjusts heating for children	1.73	2.07	0.83	0.40	-2.33	5.79	2.15
C(A9_visitors, Treatment(reference=0))[T.1]	Adjusts heating for visitors	-1.03	1.64	-0.63	0.53	-4.24	2.18	2.21
C(A9_pets, Treatment(reference=0))[T.1]	Adjusts heating for pets	-0.27	4.82	-0.06	0.96	-9.70	9.17	1.42
C(A9_illness, Treatment(reference=0))[T.1]	Adjusts heating when ill	1.87	1.84	1.02	0.31	-1.73	5.46	1.86
C(A9_wfh, Treatment(reference=0))[T.1]	Adjusts heating when WFH	-0.21	1.64	-0.13	0.90	-3.42	3.01	2.76
C(A9_none, Treatment(reference=0))[T.1]	Adjusts heating: none of the above	2.32	3.94	0.59	0.56	-5.41	10.05	3.29
C(A10_how_often, Treatment(reference="Always"))[T.Never]	Adjusts heating when unoccupied: Never (vs always)	-1.69	2.41	-0.70	0.48	-6.41	3.03	1.75
C(A10_how_often, Treatment(reference="Always"))[T.Not_applicable]	Adjusts heating when unoccupied: n/a (vs always)	-1.67	3.38	-0.49	0.62	-8.28	4.95	1.82

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C(A10_how_often, Treatment(reference="Always"))[T.Not_very_often]	Adjusts heating when unoccupied: Not very often (vs always)	0.45	2.02	0.22	0.82	-3.50	4.40	1.89
C(A10_how_often, Treatment(reference="Always"))[T.Quite_often]	Adjusts heating when unoccupied: Quite often (vs always)	1.04	2.20	0.47	0.64	-3.28	5.36	1.73
C(A10_how_often, Treatment(reference="Always"))[T.Very_often]	Adjusts heating when unoccupied: Very often (vs always)	-1.37	1.97	-0.69	0.49	-5.24	2.50	1.86
C(A11, Treatment(reference="No"))[T.Yes]	Living spaces not heated during winter	-2.10	1.44	-1.46	0.14	-4.91	0.72	2.16
C(hot_water_taps, Treatment(reference="Gas"))[T.Electricity or both]	Taps hot water fuel: Electricity or both vs gas	3.38	4.41	0.77	0.44	-5.27	12.03	4.27
C(hot_water_taps, Treatment(reference="Gas"))[T.Neither]	Taps hot water fuel:	-1.60	3.37	-0.47	0.64	-8.20	5.01	10.98

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	Neither electricity or gas							
C(hot_water_shower, Treatment(reference="Gas"))[T.Both]	Shower hot water fuel: Both fuels vs gas	1.96	3.86	0.51	0.61	-5.61	9.52	1.77
C(hot_water_shower, Treatment(reference="Gas"))[T.Dont know or neither]	Shower hot water fuel: Don't know or neither vs gas	2.29	3.44	0.66	0.51	-4.46	9.04	9.70
C(hot_water_shower, Treatment(reference="Gas"))[T.Electricity]	Shower hot water fuel: Electricity vs gas	-1.33	2.44	-0.55	0.59	-6.11	3.45	3.69
C(A13_often_lights, Treatment(reference="Always"))[T.Quite often, not very often, not applicable, or never]	How often do you switch off lights: Quite often, not very often, not applicable, or never vs always	2.74	2.37	1.16	0.25	-1.91	7.40	1.87
C(A13_often_lights, Treatment(reference="Always"))[T.Very often]	How often do you switch off lights: very often vs always	2.87	1.51	1.91	0.06	-0.08	5.82	2.37

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C(A13_often_clothes, Treatment(reference="Very often"))[T.Always]	How often do you put on more clothes when it is cold: Always vs very often	-1.48	1.85	-0.80	0.42	-5.10	2.15	2.29
C(A13_often_clothes, Treatment(reference="Very often"))[T.Never, or not applicable]	How often do you put on more clothes when it is cold: Never or n/a vs very often	10.84	5.08	2.13	0.03	0.88	20.79	1.73
C(A13_often_clothes, Treatment(reference="Very often"))[T.Not very often]	How often do you put on more clothes when it is cold: Not very often vs very often	3.27	2.34	1.40	0.16	-1.31	7.86	2.09
C(A13_often_clothes, Treatment(reference="Very often"))[T.Quite often]	How often do you put on more clothes when it is cold:	1.49	1.63	0.91	0.36	-1.71	4.68	2.57

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	Quite often vs very often							
C(A14, Treatment(reference="Some effort"))[T.A great deal of effort]	Effort to limit energy use: A great deal of effort vs some effort	-6.18	1.81	-3.41	0.00	-9.73	-2.62	2.28
C(A14, Treatment(reference="Some effort"))[T.A little effort]	Effort to limit energy use: A little effort vs some effort	-0.92	1.91	-0.48	0.63	-4.66	2.82	2.19
C(A14, Treatment(reference="Some effort"))[T.No effort at all or don't know]	Effort to limit energy use: No effort or don't know vs some effort	1.14	4.08	0.28	0.78	-6.87	9.14	1.53
C(A15_cold, Treatment(reference="Not very often"))[T.Always]	Open windows, cold day: Always vs not very often	7.32	3.35	2.19	0.03	0.76	13.88	1.43
C(A15_cold, Treatment(reference="Not very often"))[T.Never or don't know]	Open windows,	1.57	1.83	0.85	0.39	-2.03	5.16	2.23

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	cold day: Never or don't know vs not very often								
C(A15_cold, Treatment(reference="Not very often"))[T.Quite often]	Open windows, cold day: Quite often vs not very often	2.37	1.88	1.26	0.21	-1.32	6.07	2.05	
C(A15_cold, Treatment(reference="Not very often"))[T.Very often]	Open windows, cold day: Very often vs not very often	4.52	3.03	1.49	0.14	-1.42	10.46	1.57	
C(A15_warm, Treatment(reference="Always"))[T.Not very often or never]	Open windows, warm day: Not very often or never vs always	7.60	3.90	1.95	0.05	-0.04	15.24	1.62	
C(A15_warm, Treatment(reference="Always"))[T.Quite often]	Open windows, warm day: Quite often or never vs always	-4.69	2.81	-1.67	0.09	-10.20	0.81	1.66	
C(A15_warm, Treatment(reference="Always"))[T.Very often]	Open windows, warm day:	0.60	1.57	0.38	0.70	-2.47	3.67	2.26	

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	Very often or never vs always							
C(A16_no, Treatment(reference=1))[T.0.0]	Considerin g changes to heating or energy supply in 12 months	-2.95	3.95	-0.75	0.46	-10.69	4.79	9.12
C(A16_na, Treatment(reference=0))[T.1.0]	Considerin g changes to heating or energy supply in 12 months: n/a	5.27	5.01	1.05	0.29	-4.54	15.09	5.33
C(A16_gas_boiler, Treatment(reference=0))[T.1.0]	Considerin g gas boiler	4.30	4.49	0.96	0.34	-4.51	13.11	3.45
C(A16_pv, Treatment(reference=0))[T.1.0]	Considerin g solar PV	7.81	4.46	1.75	0.08	-0.93	16.55	2.06
C(A16_wood_burner, Treatment(reference=0))[T.1.0]	Considerin g wood burner	-11.39	6.41	-1.78	0.08	-23.96	1.17	2.24
C(B4, Treatment(reference="Own / part-own"))[T.Private rental]	Private rental vs owner/par t-owner	-0.10	2.77	-0.04	0.97	-5.52	5.32	2.71
C(B4, Treatment(reference="Own / part-own"))[T.Social rental / rent free]	Social rental / rent free vs owner/par t-owner	3.15	4.21	0.75	0.46	-5.11	11.41	4.57

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C(B7_keepwarm, Treatment(reference="Yes"))[T.No or don't know]	Cannot keep warm in winter or don't know	1.20	2.88	0.42	0.68	-4.44	6.83	1.68
C(B8_damp, Treatment(reference="No"))[T.Dont_know]	Problem with damp: don't know vs no	0.85	4.79	0.18	0.86	-8.53	10.23	1.40
C(B8_damp, Treatment(reference="No"))[T.Yes]	Problem with damp: Yes vs no	1.68	1.76	0.95	0.34	-1.77	5.13	2.23
C(B10_elec_oven, Treatment(reference=1))[T.0]	Does not have electric oven	-3.63	3.47	-1.05	0.30	-10.43	3.17	6.00
C(B10_gas_oven, Treatment(reference=0))[T.1]	Has gas oven	2.85	3.39	0.84	0.40	-3.79	9.49	6.43
C(B10_elec_hob, Treatment(reference=0))[T.1]	Has electric hob	0.34	2.75	0.13	0.90	-5.04	5.72	8.72
C(B10_gas_hob, Treatment(reference=1))[T.0]	Does not have gas hob	-0.75	2.58	-0.29	0.77	-5.81	4.30	9.53
C(B10_dish, Treatment(reference=1))[T.0]	Does not have dishwasher	-1.13	1.76	-0.64	0.52	-4.57	2.31	3.75
C(B10_fridge, Treatment(reference=1))[T.0]	Does not have fridge	-4.94	4.22	-1.17	0.24	-13.20	3.32	1.62

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C(B10_freezer, Treatment(reference=0))[T.1]	Has standalon e freezer	2.08	1.49	1.39	0.16	-0.85	5.01	2.35
C(B10_combined_wash, Treatment(reference=0))[T.1]	Has combined clothes washer dryer	-6.48	4.97	-1.31	0.19	-16.22	3.25	12.78
C(B10_washing, Treatment(reference=1))[T.0]	Does not have washing machine	6.48	4.82	1.35	0.18	-2.96	15.92	13.23
C(B10_dryer, Treatment(reference=0))[T.1]	Has tumble dryer	-2.13	1.59	-1.34	0.18	-5.23	0.98	3.84
C(B10_laptop, Treatment(reference=1))[T.0]	Does not have laptop or computer	-3.99	2.51	-1.59	0.11	-8.91	0.92	1.68
C(B10_tv, Treatment(reference=1))[T.0]	Does not have TV	-4.32	4.08	-1.06	0.29	-12.33	3.68	1.68
C(B10_acu, Treatment(reference=0))[T.1]	Has ACU	8.04	4.23	1.90	0.06	-0.25	16.33	1.48
C(B10_fan, Treatment(reference=0))[T.1]	Has cooling fan	2.09	1.38	1.52	0.13	-0.61	4.80	2.53
C(D4, Treatment(reference="Doing alright"))[T.Finding it quite difficult]	Managing financially : Finding it quite difficult vs doing alright	5.88	4.34	1.36	0.18	-2.62	14.38	1.68
C(D4, Treatment(reference="Doing alright"))[T.Finding it very difficult / prefer not to say / dont know]	Managing financially : Finding it	1.07	3.97	0.27	0.79	-6.71	8.85	1.48

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	very difficult / prefer not to say / dont know vs doing alright							
C(D4, Treatment(reference="Doing alright"))[T.Just about getting by]	Managing financially : Just about getting by vs doing alright	0.01	1.89	0.00	1.00	-3.69	3.70	2.15
C(D4, Treatment(reference="Doing alright"))[T.Living comfortably]	Managing financially : Living comfortably vs doing alright	-0.95	1.59	-0.60	0.55	-4.07	2.18	2.72
C(glazedArea, Treatment(reference="Normal or less than typical"))[T.More than typical or much more than typical]	Glazed area: More than typical or much more than typical vs Normal or less than typical	-3.85	3.53	-1.09	0.28	-10.77	3.06	1.41
C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Average]	Hot water energy efficiency: average vs good	1.30	2.21	0.59	0.56	-3.02	5.62	2.31

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C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Poor]	Hot water energy efficiency: poor vs good	-4.48	3.77	-1.19	0.23	-11.87	2.90	2.14
C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Good]	Hot water energy efficiency: very good vs good	9.78	5.52	1.77	0.08	-1.04	20.60	4.25
C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Hot water energy efficiency: very poor vs good	-11.08	5.33	-2.08	0.04	-21.52	-0.65	2.74
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Average]	Lighting energy efficiency: average vs very good	-1.60	5.12	-0.31	0.75	-11.64	8.44	11.21
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Good]	Lighting energy efficiency: good vs very good	1.64	3.35	0.49	0.62	-4.92	8.20	5.15
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Poor]	Lighting energy efficiency: Poor vs very good	0.54	6.67	0.08	0.94	-12.54	13.62	11.02
C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Very Poor]	Lighting energy efficiency: very poor vs very good	2.14	7.94	0.27	0.79	-13.41	17.70	22.12

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C(tenure, Treatment(reference="owner-occupied"))[T.rental (private)]	Private rental vs owner/part-owner	2.08	2.18	0.95	0.34	-2.20	6.36	2.13
C(tenure, Treatment(reference="owner-occupied"))[T.rental (social) / Other]	Social rental / other vs owner/part-owner	-6.82	3.81	-1.79	0.07	-14.28	0.64	4.08
C(B9, Treatment(reference="1950 to 1975"))[T.1900 to 1929]	Build date: 1900-1929 vs 1950-1975	6.03	3.25	1.86	0.06	-0.33	12.40	4.50
C(B9, Treatment(reference="1950 to 1975"))[T.1930 to 1949]	Build date: 1930-1949 vs 1950-1975	1.37	2.88	0.48	0.64	-4.28	7.01	3.91
C(B9, Treatment(reference="1950 to 1975"))[T.1976 to 1990]	Build date: 1976-1990 vs 1950-1975	-4.78	2.57	-1.86	0.06	-9.83	0.26	3.15
C(B9, Treatment(reference="1950 to 1975"))[T.1991 to 2002]	Build date: 1991-2002 vs 1950-1975	-5.42	3.90	-1.39	0.16	-13.06	2.21	5.33
C(B9, Treatment(reference="1950 to 1975"))[T.2003 onwards]	Build date: 2003 onwards	-5.11	4.46	-1.15	0.25	-13.86	3.63	4.38

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	vs 1950-1975							
C(B9, Treatment(reference="1950 to 1975"))[T.Before 1900]	Build date: Before 1900 vs 1950-1975	5.15	3.65	1.41	0.16	-2.01	12.31	3.96
C(B9, Treatment(reference="1950 to 1975"))[T.Dont know]	Build date: Don't know vs 1950-1975	4.80	3.94	1.22	0.22	-2.93	12.53	2.09
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.2003-2006 / 2007 onwards]	Build date: 2003-2006/2007 vs 1950-1966	0.74	5.11	0.14	0.89	-9.29	10.76	5.06
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1900-1929]	Build date: 1900-1929 vs 1950-1966	2.98	3.60	0.83	0.41	-4.08	10.04	6.47
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1930-1949]	Build date: 1930-1949 vs 1950-1966	0.99	2.93	0.34	0.74	-4.75	6.74	4.35
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1967-1975]	Build date: 1967-1975 vs	-1.77	2.53	-0.70	0.48	-6.73	3.19	2.38

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C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1976-1982]	1950-1966 Build date: 1976-1982 vs 1950-1966	-3.95	3.41	-1.16	0.25	-10.63	2.74	2.15
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1983-1990]	Build date: 1983-1990 vs 1950-1966	2.29	3.51	0.65	0.51	-4.59	9.17	3.84
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1991-1995]	Build date: 1991-1995 vs 1950-1966	0.76	4.56	0.17	0.87	-8.17	9.69	2.62
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1996-2002]	Build date: 1996-2002 vs 1950-1966	3.16	4.49	0.71	0.48	-5.63	11.95	4.82
C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: before 1900]	Build date: Before 1900 vs 1950-1966	5.15	4.00	1.29	0.20	-2.70	12.99	3.86
C(B1, Treatment(reference="Semi detached"))[T.Converted house or commercial building]	Converted house or commercial building	-4.72	6.71	-0.70	0.48	-17.86	8.43	3.46

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	vs semi-detached							
C(B1, Treatment(reference="Semi detached"))[T.Detached]	Detached vs semi-detached	-2.54	4.32	-0.59	0.56	-11.02	5.93	16.94
C(B1, Treatment(reference="Semi detached"))[T.Purpose built flat]	Purpose built flat vs semi-detached	-1.70	6.13	-0.28	0.78	-13.71	10.32	14.35
C(B1, Treatment(reference="Semi detached"))[T.Terraced]	Terraced vs semi-detached	-0.76	2.90	-0.26	0.79	-6.44	4.92	8.21
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.<=19.0]	Heating set-point: <=19C vs >20C & <=22C	-6.90	1.94	-3.56	0.00	-10.70	-3.10	2.38
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>19.0 & <=20.0]	Heating set-point: >19C & <=20C vs >20C & <=22C	-4.09	1.89	-2.17	0.03	-7.79	-0.39	2.37
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>22.0]	Heating set-point: >22C vs >20C & <=22C	2.90	2.59	1.12	0.26	-2.19	7.98	1.77
C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.Not applicable]	Heating set-point: n/a vs >20C & <=22C	-3.92	2.75	-1.43	0.15	-9.31	1.47	4.37
C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Walls energy eff.:	0.52	2.91	0.18	0.86	-5.18	6.22	1.94

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	Average vs good or very good								
C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Walls energy eff.: Poor vs good or very good	-1.42	2.28	-0.62	0.53	-5.89	3.05	2.73	
C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Walls energy eff.: very poor vs good or very good	-5.57	2.76	-2.02	0.04	-10.98	-0.15	6.59	
C(roofEnergyEff, Treatment(reference="Good"))[T.Average]	Roof energy eff.: average vs good	1.69	1.85	0.92	0.36	-1.92	5.31	2.28	
C(roofEnergyEff, Treatment(reference="Good"))[T.Poor]	Roof energy eff.: Poor vs good	-0.66	3.29	-0.20	0.84	-7.10	5.78	1.56	
C(roofEnergyEff, Treatment(reference="Good"))[T.Very Good]	Roof energy eff.: Very good vs good	1.83	2.56	0.71	0.48	-3.18	6.83	1.61	
C(roofEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Roof energy eff.: very poor vs good	-3.25	2.43	-1.34	0.18	-8.01	1.51	2.51	
C(roofEnergyEff, Treatment(reference="Good"))[T.n/a or missing]	Roof energy eff.: n/a or	0.36	3.55	0.10	0.92	-6.58	7.31	3.83	

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	missing vs good							
C(mainheatEnergyEff, Treatment(reference="Good"))[T.Average]	Main heat energy eff.: average vs good	-2.85	4.31	-0.66	0.51	-11.30	5.60	3.54
C(mainheatEnergyEff, Treatment(reference="Good"))[T.Poor or very poor]	Main heat energy eff.: Poor or very poor vs good	7.37	6.32	1.17	0.24	-5.01	19.75	4.24
C(mainheatEnergyEff, Treatment(reference="Good"))[T.Very Good]	Main heat energy eff.: very good vs good	-10.16	6.41	-1.58	0.11	-22.73	2.41	4.58
C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Main heat controls energy eff.: average vs good or very good	1.36	1.57	0.86	0.39	-1.73	4.44	2.64
C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Main heat controls energy eff.: Poor vs good or very good	-3.04	3.68	-0.83	0.41	-10.24	4.17	2.44
C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Main heat controls energy eff.: Very poor vs	1.12	3.42	0.33	0.74	-5.58	7.81	1.73

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	good or very good							
C(windowsEnergyEff, Treatment(reference="Average"))[T.Good]	Windows energy eff.: Good vs average	-2.95	1.63	-1.81	0.07	-6.14	0.24	2.69
C(windowsEnergyEff, Treatment(reference="Average"))[T.Poor]	Windows energy eff.: Poor vs average	4.38	2.73	1.61	0.11	-0.96	9.72	1.81
C(windowsEnergyEff, Treatment(reference="Average"))[T.Very Poor]	Windows energy eff.: Very poor vs average	1.20	3.49	0.34	0.73	-5.63	8.04	1.74
C(propertyType, Treatment(reference="House"))[T.Bungalow]	Bungalow vs house	1.60	2.53	0.63	0.53	-3.36	6.56	2.72
C(propertyType, Treatment(reference="House"))[T.Flat or maisonette]	Flat or maisonette vs house	0.86	5.92	0.15	0.88	-10.75	12.47	17.22
C(builtForm, Treatment(reference="Semi-Detached"))[T.Detached]	Detached vs semi-detached	5.51	4.09	1.35	0.18	-2.52	13.53	16.40
C(builtForm, Treatment(reference="Semi-Detached"))[T.Enclosed terrace or no data]	Enclosed terrace or no data vs semi-detached	-5.35	4.55	-1.18	0.24	-14.27	3.57	1.88
C(builtForm, Treatment(reference="Semi-Detached"))[T.End-Terrace]	End-terrace vs semi-detached	-4.53	2.98	-1.52	0.13	-10.37	1.31	3.33
C(builtForm, Treatment(reference="Semi-Detached"))[T.Mid-Terrace]	Mid-terrace vs semi-detached	-5.79	3.03	-1.91	0.06	-11.72	0.14	7.69

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hdd_c	Heating degree days (centred)	5.35	0.83	6.48	0.00	3.73	6.97	115.87
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST MIDLANDS]	East Midlands vs South East	-0.53	0.37	-1.41	0.16	-1.26	0.21	2.40
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.EAST OF ENGLAND]	East of England vs South East	-0.15	0.35	-0.43	0.67	-0.83	0.53	2.45
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.GREATER LONDON]	Greater London vs South East	0.18	0.35	0.52	0.60	-0.50	0.86	3.36
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.NORTH WEST]	North West vs South East	-0.78	0.43	-1.82	0.07	-1.63	0.06	2.16
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.SOUTH WEST]	South West vs South East	0.26	0.35	0.73	0.46	-0.43	0.95	2.67
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WALES]	Wales vs South East	-0.87	0.46	-1.90	0.06	-1.76	0.03	2.50
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.WEST MIDLANDS]	West Midlands vs South East	-0.38	0.38	-0.98	0.33	-1.13	0.38	2.46
hdd_c:C(Region, Treatment(reference="SOUTH EAST"))[T.YORKSHIRE AND NORTH EAST]	Yorkshire & NE vs SE	-0.11	0.49	-0.22	0.82	-1.06	0.85	2.40
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.1]	IMD 1 vs 3	0.49	0.32	1.52	0.13	-0.14	1.12	2.36
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.2]	IMD 2 vs 3	0.20	0.29	0.72	0.47	-0.35	0.76	2.34
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.4]	IMD 4 vs 3	0.78	0.28	2.82	0.01	0.24	1.33	2.97
hdd_c:C(IMD_quintile, Treatment(reference=3))[T.5]	IMD 5 vs 3	0.74	0.29	2.55	0.01	0.17	1.31	3.19
hdd_c:C(dayofweek, Treatment(reference=0))[T.1]	Tue vs Mon	-0.08	0.04	-1.92	0.06	-0.16	0.00	2.12

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hdd_c:C(dayofweek, Treatment(reference=0))[T.2]	Wed vs Mon	0.03	0.04	0.85	0.40	-0.05	0.11	2.15
hdd_c:C(dayofweek, Treatment(reference=0))[T.3]	Thu vs Mon	-0.23	0.04	-5.58	0.00	-0.31	-0.15	2.03
hdd_c:C(dayofweek, Treatment(reference=0))[T.4]	Fri vs Mon	-0.07	0.04	-1.57	0.12	-0.15	0.02	2.00
hdd_c:C(dayofweek, Treatment(reference=0))[T.5]	Sat vs Mon	0.06	0.04	1.40	0.16	-0.02	0.14	1.96
hdd_c:C(dayofweek, Treatment(reference=0))[T.6]	Sun vs Mon	0.10	0.04	2.26	0.02	0.01	0.18	1.93
hdd_c:C(bank_holiday, Treatment(reference=0))[T.1]	Is bank holiday	-1.51	0.12	-12.75	0.00	-1.74	-1.28	2.02
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Portable electric/assumed]	Has Portable electric/assumed	0.79	0.75	1.05	0.30	-0.69	2.26	2.02
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, electric]	Has Room heaters, electric	-0.56	0.30	-1.87	0.06	-1.15	0.03	2.30
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, mains gas]	Has Room heaters, mains gas	-0.03	0.26	-0.11	0.91	-0.54	0.48	3.37
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, solid fuel]	Has Room heaters, solid fuel	-0.22	0.50	-0.43	0.67	-1.19	0.76	1.97
hdd_c:C(secondheatDescription, Treatment(reference="None"))[T.Room heaters, wood logs]	Has Room heaters, wood logs	-0.90	0.57	-1.58	0.11	-2.01	0.21	1.73
hdd_c:C(Collection_method, Treatment(reference="Online"))[T.Postal]	Postal vs online response	0.10	0.21	0.50	0.62	-0.30	0.50	2.59
hdd_c:C(A2, Treatment(reference="Not at all"))[T.A little]	Smart meter effect: A little vs not at all	-0.53	0.23	-2.31	0.02	-0.97	-0.08	2.17

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hdd_c:C(A2, Treatment(reference="Not at all"))[T.A lot]	Smart meter effect: A lot vs not at all	0.01	0.38	0.02	0.99	-0.74	0.75	1.76
hdd_c:C(A2, Treatment(reference="Not at all"))[T.Don't know or not applicable (A1: No)]	Smart meter effect: Don't know or n/a	-0.67	0.68	-0.98	0.33	-2.00	0.67	1.66
hdd_c:C(A2, Treatment(reference="Not at all"))[T.Some]	Smart meter effect: Some vs not at all	0.01	0.27	0.03	0.98	-0.52	0.54	2.01
hdd_c:C(central_heating_combined, Treatment(reference="Gas/Gas"))[T.Both]	Central heating: Both fuels vs gas	0.87	0.55	1.58	0.11	-0.21	1.94	1.69
hdd_c:C(central_heating_combined, Treatment(reference="Gas/Gas"))[T.Electricity/Electricity]	Central heating: Elec. vs gas	-0.90	0.99	-0.91	0.36	-2.83	1.03	7.86
hdd_c:C(A4_timer, Treatment(reference=1))[T.0]	No timer heating control	0.45	0.34	1.33	0.18	-0.21	1.11	3.07
hdd_c:C(A4_temp, Treatment(reference=1))[T.0]	No temp. heating control	0.06	0.38	0.16	0.87	-0.69	0.82	5.00
hdd_c:C(A4_smart, Treatment(reference=0))[T.1]	Has smart heating control	-0.49	0.27	-1.84	0.07	-1.02	0.03	2.48
hdd_c:C(A4_manual, Treatment(reference=0))[T.1]	Manual heating	-0.42	0.52	-0.79	0.43	-1.44	0.61	2.01

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	control only							
hdd_c:C(A6_7_dummy_mains, Treatment(reference=0))[T.1.0]	Has mains powered standalone heaters	-0.33	0.22	-1.51	0.13	-0.76	0.10	2.72
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Daily]	Has non-mains powered standalone heaters, used daily	-0.27	0.81	-0.34	0.74	-1.86	1.31	1.60
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Most days]	Has non-mains powered standalone heaters, used most days	0.82	0.68	1.21	0.23	-0.51	2.15	1.64
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Rarely or never]	Has non-mains powered standalone heaters, used rarely or never	0.12	0.58	0.20	0.84	-1.02	1.26	1.59
hdd_c:C(A8_use_own, Treatment(reference="None or don't know"))[T.Varies]	Has non-mains powered standalone heaters, use varies	-0.84	0.58	-1.44	0.15	-1.97	0.30	1.44
hdd_c:C(A9_cold, Treatment(reference=1))[T.0]	Does not adjust	-0.52	0.41	-1.25	0.21	-1.32	0.29	3.42

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	heating when cold								
hdd_c:C(A9_children, Treatment(reference=0))[T.1]	Adjusts heating for children	0.33	0.29	1.14	0.26	-0.24	0.90	2.20	
hdd_c:C(A9_visitors, Treatment(reference=0))[T.1]	Adjusts heating for visitors	-0.38	0.23	-1.65	0.10	-0.83	0.07	2.21	
hdd_c:C(A9_pets, Treatment(reference=0))[T.1]	Adjusts heating for pets	-0.15	0.68	-0.21	0.83	-1.47	1.18	1.40	
hdd_c:C(A9_illness, Treatment(reference=0))[T.1]	Adjusts heating when ill	0.24	0.26	0.93	0.35	-0.27	0.75	1.89	
hdd_c:C(A9_wfh, Treatment(reference=0))[T.1]	Adjusts heating when WFH	-0.04	0.23	-0.18	0.86	-0.49	0.41	2.85	
hdd_c:C(A9_none, Treatment(reference=0))[T.1]	Adjusts heating: none of the above	0.55	0.55	1.00	0.32	-0.53	1.64	3.30	
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Never]	Adjusts heating when unoccupie d: Never (vs always)	-0.30	0.34	-0.89	0.37	-0.96	0.36	1.80	
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Not_applicable]	Adjusts heating when unoccupie d: n/a (vs always)	-0.51	0.47	-1.08	0.28	-1.44	0.42	1.80	

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hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Not_very_often]	Adjusts heating when unoccupied: Not very often (vs always)	-0.07	0.28	-0.23	0.82	-0.62	0.49	1.92
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Quite_often]	Adjusts heating when unoccupied: Quite often (vs always)	0.13	0.31	0.41	0.68	-0.48	0.73	1.73
hdd_c:C(A10_how_often, Treatment(reference="Always"))[T.Very_often]	Adjusts heating when unoccupied: Very often (vs always)	-0.31	0.28	-1.12	0.26	-0.85	0.23	1.89
hdd_c:C(A11, Treatment(reference="No"))[T.Yes]	Living spaces not heated during winter	-0.32	0.20	-1.58	0.11	-0.72	0.08	2.15
hdd_c:C(hot_water_taps, Treatment(reference="Gas"))[T.Electricity or both]	Taps hot water fuel: Electricity or both vs gas	-0.23	0.62	-0.37	0.71	-1.44	0.98	4.23
hdd_c:C(hot_water_taps, Treatment(reference="Gas"))[T.Neither]	Taps hot water fuel:	-0.11	0.47	-0.23	0.82	-1.04	0.82	10.61

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	Neither electricity or gas							
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Both]	Shower hot water fuel: Both fuels vs gas	0.66	0.54	1.21	0.23	-0.40	1.72	1.78
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Dont know or neither]	Shower hot water fuel: Don't know or neither vs gas	0.40	0.48	0.83	0.41	-0.55	1.35	9.37
hdd_c:C(hot_water_shower, Treatment(reference="Gas"))[T.Electricity]	Shower hot water fuel: Electricity vs gas	-0.01	0.34	-0.03	0.98	-0.68	0.66	3.71
hdd_c:C(A13_ofTEN_lights, Treatment(reference="Always"))[T.Quite often, not very often, not applicable, or never]	How often do you switch off lights: Quite often, not very often, not applicable, or never vs always	0.04	0.33	0.10	0.92	-0.62	0.69	1.87
hdd_c:C(A13_ofTEN_lights, Treatment(reference="Always"))[T.Very often]	How often do you switch off lights: very often vs always	0.25	0.21	1.20	0.23	-0.16	0.67	2.40

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hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Always]	How often do you put on more clothes when it is cold: Always vs very often	-0.21	0.26	-0.79	0.43	-0.72	0.30	2.29
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Never, or not applicable]	How often do you put on more clothes when it is cold: Never or n/a vs very often	1.97	0.71	2.77	0.01	0.58	3.37	1.75
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Not very often]	How often do you put on more clothes when it is cold: Not very often vs very often	-0.01	0.33	-0.03	0.98	-0.65	0.64	2.14
hdd_c:C(A13_often_clothes, Treatment(reference="Very often"))[T.Quite often]	How often do you put on more clothes when it is cold:	0.15	0.23	0.64	0.52	-0.30	0.60	2.58

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	Quite often vs very often							
hdd_c:C(A14, Treatment(reference="Some effort"))[T.A great deal of effort]	Effort to limit energy use: A great deal of effort vs some effort	-0.91	0.26	-3.57	0.00	-1.41	-0.41	2.26
hdd_c:C(A14, Treatment(reference="Some effort"))[T.A little effort]	Effort to limit energy use: A little effort vs some effort	-0.16	0.27	-0.60	0.55	-0.69	0.37	2.23
hdd_c:C(A14, Treatment(reference="Some effort"))[T.No effort at all or don't know]	Effort to limit energy use: No effort or don't know vs some effort	0.17	0.57	0.30	0.77	-0.95	1.29	1.57
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Always]	Open windows, cold day: Always vs not very often	0.52	0.47	1.10	0.27	-0.41	1.44	1.43
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Never or don't know]	Open windows,	0.22	0.26	0.86	0.39	-0.28	0.73	2.24

	cold day: Never or don't know vs not very often								
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Quite often]	Open windows, cold day: Quite often vs not very often	0.33	0.27	1.26	0.21	-0.18	0.85	2.04	
hdd_c:C(A15_cold, Treatment(reference="Not very often"))[T.Very often]	Open windows, cold day: Very often vs not very often	0.51	0.43	1.21	0.23	-0.32	1.35	1.58	
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Not very often or never]	Open windows, warm day: Not very often or never vs always	0.72	0.55	1.31	0.19	-0.36	1.79	1.66	
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Quite often]	Open windows, warm day: Quite often or never vs always	-0.32	0.39	-0.81	0.42	-1.09	0.45	1.69	
hdd_c:C(A15_warm, Treatment(reference="Always"))[T.Very often]	Open windows, warm day:	0.07	0.22	0.31	0.76	-0.36	0.50	2.33	

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	Very often or never vs always							
hdd_c:C(A16_no, Treatment(reference=1))[T.0.0]	Considerin g changes to heating or energy supply in 12 months	-0.67	0.56	-1.21	0.23	-1.76	0.42	9.17
hdd_c:C(A16_na, Treatment(reference=0))[T.1.0]	Considerin g changes to heating or energy supply in 12 months: n/a	1.00	0.70	1.42	0.16	-0.38	2.38	5.29
hdd_c:C(A16_gas_boiler, Treatment(reference=0))[T.1.0]	Considerin g gas boiler	0.97	0.63	1.54	0.12	-0.27	2.21	3.47
hdd_c:C(A16_pv, Treatment(reference=0))[T.1.0]	Considerin g solar PV	0.85	0.63	1.36	0.18	-0.38	2.08	2.07
hdd_c:C(A16_wood_burner, Treatment(reference=0))[T.1.0]	Considerin g wood burner	-1.17	0.90	-1.30	0.20	-2.94	0.60	2.24
hdd_c:C(B4, Treatment(reference="Own / part-own"))[T.Private rental]	Private rental vs owner/par t-owner	0.26	0.39	0.68	0.50	-0.50	1.02	2.82
hdd_c:C(B4, Treatment(reference="Own / part-own"))[T.Social rental / rent free]	Social rental / rent free vs owner/par t-owner	0.50	0.59	0.85	0.40	-0.66	1.66	4.63

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hdd_c:C(B7_keepwarm, Treatment(reference="Yes"))[T.No or don't know]	Cannot keep warm in winter or don't know	0.33	0.40	0.83	0.41	-0.46	1.13	1.70
hdd_c:C(B8_damp, Treatment(reference="No"))[T.Dont_know]	Problem with damp: don't know vs no	0.50	0.67	0.74	0.46	-0.83	1.82	1.43
hdd_c:C(B8_damp, Treatment(reference="No"))[T.Yes]	Problem with damp: Yes vs no	0.21	0.25	0.84	0.40	-0.28	0.69	2.24
hdd_c:C(B10_elec_oven, Treatment(reference=1))[T.0]	Does not have electric oven	-0.42	0.49	-0.85	0.40	-1.37	0.54	6.05
hdd_c:C(B10_gas_oven, Treatment(reference=0))[T.1]	Has gas oven	0.25	0.48	0.52	0.60	-0.69	1.18	6.47
hdd_c:C(B10_elec_hob, Treatment(reference=0))[T.1]	Has electric hob	0.15	0.39	0.40	0.69	-0.60	0.91	8.91
hdd_c:C(B10_gas_hob, Treatment(reference=1))[T.0]	Does not have gas hob	-0.04	0.36	-0.11	0.91	-0.75	0.67	9.60
hdd_c:C(B10_dish, Treatment(reference=1))[T.0]	Does not have dishwasher	-0.10	0.25	-0.40	0.69	-0.58	0.38	3.98
hdd_c:C(B10_fridge, Treatment(reference=1))[T.0]	Does not have fridge	-0.87	0.59	-1.47	0.14	-2.03	0.29	1.64

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hdd_c:C(B10_freezer, Treatment(reference=0))[T.1]	Has standalon e freezer	0.46	0.21	2.17	0.03	0.04	0.87	2.40
hdd_c:C(B10_combined_wash, Treatment(reference=0))[T.1]	Has combined clothes washer dryer	-1.20	0.70	-1.71	0.09	-2.57	0.17	12.91
hdd_c:C(B10_washing, Treatment(reference=1))[T.0]	Does not have washing machine	0.93	0.68	1.37	0.17	-0.40	2.26	13.25
hdd_c:C(B10_dryer, Treatment(reference=0))[T.1]	Has tumble dryer	-0.45	0.22	-2.01	0.04	-0.89	-0.01	3.93
hdd_c:C(B10_laptop, Treatment(reference=1))[T.0]	Does not have laptop or computer	-0.50	0.35	-1.41	0.16	-1.19	0.20	1.67
hdd_c:C(B10_tv, Treatment(reference=1))[T.0]	Does not have TV	-0.56	0.57	-0.98	0.33	-1.69	0.56	1.73
hdd_c:C(B10_acu, Treatment(reference=0))[T.1]	Has ACU	0.35	0.59	0.59	0.56	-0.82	1.52	1.52
hdd_c:C(B10_fan, Treatment(reference=0))[T.1]	Has cooling fan	0.10	0.19	0.53	0.59	-0.28	0.48	2.59
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Finding it quite difficult]	Managing financially : Finding it quite difficult vs doing alright	0.63	0.61	1.04	0.30	-0.56	1.83	1.70
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Finding it very difficult / prefer not to say / dont know]	Managing financially : Finding it	-0.45	0.56	-0.80	0.42	-1.54	0.65	1.47

	very difficult / prefer not to say / dont know vs doing alright								
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Just about getting by]	Managing financially : Just about getting by vs doing alright	0.10	0.27	0.36	0.72	-0.43	0.61	2.16	
hdd_c:C(D4, Treatment(reference="Doing alright"))[T.Living comfortably]	Managing financially : Living comfortably vs doing alright	0.11	0.22	0.48	0.63	-0.33	0.55	2.79	
hdd_c:C(glazedArea, Treatment(reference="Normal or less than typical"))[T.More than typical or much more than typical]	Glazed area: More than typical or much more than typical vs Normal or less than typical	-0.42	0.50	-0.84	0.40	-1.39	0.56	1.41	
hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Average]	Hot water energy efficiency: average vs good	0.12	0.31	0.40	0.69	-0.48	0.73	2.37	

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hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Poor]	Hot water energy efficiency: poor vs good	-0.82	0.53	-1.56	0.12	-1.86	0.21	2.21
hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Good]	Hot water energy efficiency: very good vs good	1.25	0.77	1.62	0.11	-0.26	2.77	4.10
hdd_c:C(hotWaterEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Hot water energy efficiency: very poor vs good	-1.90	0.75	-2.53	0.01	-3.37	-0.43	2.79
hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Average]	Lighting energy efficiency: average vs very good	0.40	0.72	0.55	0.58	-1.02	1.81	18.41
hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Good]	Lighting energy efficiency: good vs very good	0.37	0.47	0.78	0.44	-0.56	1.29	7.44
hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Poor]	Lighting energy efficiency: Poor vs very good	0.50	0.94	0.53	0.59	-1.34	2.34	17.80
hdd_c:C(lightingEnergyEff, Treatment(reference="Very Good"))[T.Very Poor]	Lighting energy efficiency: very poor vs very good	0.76	1.12	0.68	0.49	-1.42	2.95	35.16

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hdd_c:C(tenure, Treatment(reference="owner-occupied"))[T.rental (private)]	Private rental vs owner/part-owner	0.21	0.31	0.68	0.50	-0.39	0.81	2.15
hdd_c:C(tenure, Treatment(reference="owner-occupied"))[T.rental (social) / Other]	Social rental / other vs owner/part-owner	-1.15	0.54	-2.16	0.03	-2.20	-0.11	4.13
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1900 to 1929]	Build date: 1900-1929 vs 1950-1975	1.08	0.46	2.37	0.02	0.19	1.98	4.58
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1930 to 1949]	Build date: 1930-1949 vs 1950-1975	0.50	0.41	1.23	0.22	-0.30	1.29	3.85
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1976 to 1990]	Build date: 1976-1990 vs 1950-1975	-0.65	0.36	-1.79	0.07	-1.36	0.06	3.21
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.1991 to 2002]	Build date: 1991-2002 vs 1950-1975	-1.02	0.55	-1.87	0.06	-2.09	0.05	5.33
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.2003 onwards]	Build date: 2003 onwards	-0.64	0.63	-1.02	0.31	-1.87	0.59	4.50

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	vs 1950-1975								
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.Before 1900]	Build date: Before 1900 vs 1950-1975	0.88	0.51	1.72	0.09	-0.12	1.89	4.06	
hdd_c:C(B9, Treatment(reference="1950 to 1975"))[T.Dont know]	Build date: Don't know vs 1950-1975	0.47	0.56	0.84	0.40	-0.62	1.55	2.08	
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.2003-2006 / 2007 onwards]	Build date: 2003-2006/2007 vs 1950-1966	0.59	0.72	0.83	0.41	-0.82	2.00	5.16	
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1900-1929]	Build date: 1900-1929 vs 1950-1966	-0.18	0.51	-0.35	0.73	-1.17	0.82	6.57	
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1930-1949]	Build date: 1930-1949 vs 1950-1966	-0.11	0.41	-0.27	0.79	-0.92	0.70	4.22	
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1967-1975]	Build date: 1967-1975 vs 1950-1966	0.06	0.36	0.16	0.88	-0.64	0.75	2.41	

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hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1976-1982]	Build date: 1976-1982 vs 1950-1966	-0.30	0.48	-0.63	0.53	-1.24	0.64	2.09
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1983-1990]	Build date: 1983-1990 vs 1950-1966	0.26	0.49	0.52	0.60	-0.71	1.23	3.89
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1991-1995]	Build date: 1991-1995 vs 1950-1966	-0.07	0.64	-0.11	0.92	-1.32	1.19	2.64
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: 1996-2002]	Build date: 1996-2002 vs 1950-1966	0.72	0.63	1.14	0.26	-0.52	1.95	4.80
hdd_c:C(constructionAgeBand, Treatment(reference="England and Wales: 1950-1966"))[T.England and Wales: before 1900]	Build date: Before 1900 vs 1950-1966	0.53	0.56	0.94	0.35	-0.57	1.63	3.90
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Converted house or commercial building]	Converted house or commercial building	-0.63	0.94	-0.67	0.50	-2.48	1.22	3.55

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	vs semi-detached								
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Detached]	Detached vs semi-detached	0.45	0.61	0.74	0.46	-0.74	1.64	17.13	
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Purpose built flat]	Purpose built flat vs semi-detached	0.35	0.86	0.41	0.69	-1.34	2.04	14.32	
hdd_c:C(B1, Treatment(reference="Semi detached"))[T.Terraced]	Terraced vs semi-detached	0.20	0.41	0.50	0.62	-0.60	1.00	8.37	
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.<=19.0]	Heating set-point: <=19C vs >20C & <=22C	-0.55	0.27	-2.01	0.04	-1.08	-0.01	2.40	
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>19.0 & <=20.0]	Heating set-point: >19C & <=20C vs >20C & <=22C	-0.42	0.27	-1.58	0.12	-0.94	0.10	2.40	
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.>22.0]	Heating set-point: >22C vs >20C & <=22C	-0.06	0.36	-0.17	0.87	-0.78	0.65	1.81	
hdd_c:C(A5_setpoint, Treatment(reference=">20.0 & <=22.0"))[T.Not applicable]	Heating set-point: n/a vs >20C & <=22C	-0.80	0.39	-2.07	0.04	-1.56	-0.04	4.45	
hdd_c:C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Walls energy eff.:	0.32	0.41	0.77	0.44	-0.48	1.12	1.95	

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	Average vs good or very good							
hdd_c:C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Walls energy eff.: Poor vs good or very good	0.03	0.32	0.09	0.93	-0.60	0.66	2.74
hdd_c:C(wallsEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Walls energy eff.: very poor vs good or very good	-0.46	0.39	-1.18	0.24	-1.22	0.30	6.86
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Average]	Roof energy eff.: average vs good	0.22	0.26	0.86	0.39	-0.29	0.73	2.33
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Poor]	Roof energy eff.: Poor vs good	-0.25	0.46	-0.53	0.60	-1.15	0.66	1.56
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Very Good]	Roof energy eff.: Very good vs good	0.35	0.36	0.98	0.33	-0.35	1.06	1.61
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.Very Poor]	Roof energy eff.: very poor vs good	-0.48	0.34	-1.40	0.16	-1.15	0.19	2.63
hdd_c:C(roofEnergyEff, Treatment(reference="Good"))[T.n/a or missing]	Roof energy eff.: n/a or	-0.11	0.50	-0.22	0.83	-1.09	0.87	3.96

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	missing vs good							
hdd_c:C(mainheatEnergyEff, Treatment(reference="Good"))[T.Average]	Main heat energy eff.: average vs good	-0.17	0.61	-0.27	0.79	-1.35	1.02	3.60
hdd_c:C(mainheatEnergyEff, Treatment(reference="Good"))[T.Poor or very poor]	Main heat energy eff.: Poor or very poor vs good	0.75	0.89	0.84	0.40	-1.00	2.50	4.33
hdd_c:C(mainheatEnergyEff, Treatment(reference="Good"))[T.Very Good]	Main heat energy eff.: very good vs good	-1.32	0.90	-1.47	0.14	-3.08	0.45	4.44
hdd_c:C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Average]	Main heat controls energy eff.: average vs good or very good	-0.04	0.22	-0.16	0.88	-0.47	0.40	2.68
hdd_c:C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Poor]	Main heat controls energy eff.: Poor vs good or very good	-0.57	0.52	-1.11	0.27	-1.59	0.44	2.47
hdd_c:C(mainheatcEnergyEff, Treatment(reference="Good or very good"))[T.Very Poor]	Main heat controls energy eff.: Very poor vs	-0.39	0.48	-0.81	0.42	-1.33	0.55	1.79

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	good or very good							
hdd_c:C(windowsEnergyEff, Treatment(reference="Average"))[T.Good]	Windows energy eff.: Good vs average	-0.40	0.23	-1.77	0.08	-0.85	0.05	2.68
hdd_c:C(windowsEnergyEff, Treatment(reference="Average"))[T.Poor]	Windows energy eff.: Poor vs average	0.46	0.38	1.20	0.23	-0.29	1.21	1.85
hdd_c:C(windowsEnergyEff, Treatment(reference="Average"))[T.Very Poor]	Windows energy eff.: Very poor vs average	0.03	0.49	0.06	0.95	-0.93	0.99	1.80
hdd_c:C(propertyType, Treatment(reference="House"))[T.Bungalow]	Bungalow vs house	0.30	0.36	0.83	0.41	-0.40	0.99	2.72
hdd_c:C(propertyType, Treatment(reference="House"))[T.Flat or maisonette]	Flat or maisonette vs house	-0.09	0.83	-0.10	0.92	-1.72	1.55	17.31
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.Detached]	Detached vs semi-detached	0.15	0.58	0.25	0.80	-0.98	1.27	16.52
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.Enclosed terrace or no data]	Enclosed terrace or no data vs semi-detached	-1.06	0.64	-1.65	0.10	-2.31	0.20	1.92
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.End-Terrace]	End-terrace vs semi-detached	-0.62	0.42	-1.47	0.14	-1.44	0.21	3.30
hdd_c:C(builtForm, Treatment(reference="Semi-Detached"))[T.Mid-Terrace]	Mid-terrace vs semi-detached	-0.99	0.43	-2.32	0.02	-1.82	-0.15	7.86

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totalFloorArea_c	Total floor area (centred)	0.23	0.03	7.48	0.00	0.17	0.30	6.09
total_rooms_avg_c	Total no. rooms (centred)	2.31	1.20	1.93	0.05	-0.03	4.66	14.10
bedrooms_c	No. bedrooms (centred)	0.30	1.28	0.23	0.82	-2.21	2.80	5.56
numberHeatedRooms_c	No. heated rooms (centred)	0.99	1.01	0.98	0.33	-0.99	2.97	9.60
occupants_adults_c	No. adult occupants (centred)	5.40	0.93	5.79	0.00	3.57	7.22	2.12
occupants_0_15_c	No. child occupants (centred)	4.13	1.10	3.76	0.00	1.98	6.28	2.51
average_adult_age_c	Avg. adult age (centred)	0.20	0.07	3.07	0.00	0.07	0.33	3.82
education_c	Adults educated (proportion, centred)	-3.11	1.72	-1.81	0.07	-6.47	0.26	1.94
working_30hr_plus_c	Adults working +30hr (proportion, centred)	2.21	2.23	0.99	0.32	-2.16	6.59	3.33
working_30hr_less_c	Adults working <30hr	-3.16	3.29	-0.96	0.34	-9.61	3.29	1.77

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	(proportion, centred)							
energyConsumptionCurrent_c	Estimated primary energy use (kWh/m ² , centred)	0.01	0.02	0.26	0.79	-0.03	0.04	10.28
negativeCurrentEnergyEfficiency_c	Negative estimated energy efficiency	0.36	0.20	1.77	0.08	-0.04	0.76	13.82
epcAge_c	Age of EPC (centred)	0.00	0.00	1.05	0.30	0.00	0.00	2.15
extensionCount_c	No. extensions (centred)	-0.31	0.98	-0.32	0.75	-2.23	1.61	1.85
lowEnergyLighting_c	Low energy lighting (% centred)	0.04	0.09	0.48	0.63	-0.13	0.22	17.29
numberOpenFireplaces_c	No. open fireplaces (centred)	-4.10	1.36	-3.01	0.00	-6.77	-1.43	2.14
solar_radiation_c	Surface solar radiation (centred)	-12.30	0.10	-127.87	0.00	-12.49	-12.11	2.60
hdd_c:totalFloorArea_c	Total floor area (centred)	0.04	0.00	8.29	0.00	0.03	0.05	6.15

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hdd_c:total_rooms_avg_c	Total no. rooms (centred)	0.11	0.17	0.64	0.52	-0.22	0.44	14.31
hdd_c:bedrooms_c	No. bedrooms (centred)	0.30	0.18	1.67	0.10	-0.05	0.65	5.59
hdd_c:numberHeatedRooms_c	No. heated rooms (centred)	0.16	0.14	1.13	0.26	-0.12	0.44	9.69
hdd_c:occupants_adults_c	No. adult occupants (centred)	0.30	0.13	2.31	0.02	0.05	0.56	2.16
hdd_c:occupants_0_15_c	No. child occupants (centred)	0.32	0.16	2.04	0.04	0.01	0.62	2.55
hdd_c:average_adult_age_c	Avg. adult age (centred)	0.01	0.01	1.44	0.15	-0.01	0.03	3.82
hdd_c:education_c	Adults educated (proportion, centred)	-0.33	0.24	-1.36	0.17	-0.80	0.14	1.94
hdd_c:working_30hr_plus_c	Adults working +30hr (proportion, centred)	0.01	0.31	0.04	0.97	-0.60	0.63	3.38
hdd_c:working_30hr_less_c	Adults working <30hr (proportion, centred)	-0.54	0.46	-1.16	0.25	-1.44	0.37	1.76

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hdd_c:energyConsumptionCurrent_c	Estimated primary energy use (kWh/m2, centred)	0.00	0.00	0.79	0.43	0.00	0.01	10.33
hdd_c:negativeCurrentEnergyEfficiency_c	Negative estimated energy efficiency	0.06	0.03	1.98	0.05	0.00	0.11	13.99
hdd_c:epcAge_c	Age of EPC (centred)	0.00	0.00	0.78	0.43	0.00	0.00	2.17
hdd_c:extensionCount_c	No. extensions (centred)	0.10	0.14	0.71	0.48	-0.17	0.37	1.90
hdd_c:lowEnergyLighting_c	Low energy lighting (% , centred)	0.01	0.01	0.96	0.34	-0.01	0.04	26.96
hdd_c:numberOpenFireplaces_c	No. open fireplaces (centred)	-0.62	0.19	-3.23	0.00	-1.00	-0.24	2.15
hdd_c:solar_radiation_c	Surface solar radiation (centred)	-0.98	0.02	-41.48	0.00	-1.03	-0.94	2.59
Group Var	221.792	0.78						
Group x hdd_c Cov	26.146	0.10						
hdd_c Var	4.3	0.02						

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Table A 5. Regression results using linear mixed effects model with random intercept and hdd slope using all data. Dependent variable total energy consumption per day (kWh/day). Number of observations: 181742. Number of groups: 682. Min. group size: 53. Max. group size: 560. Mean group size: 266.5.