ZERO CARBON RUGELEY
WP5-D1: ANALYSIS OF THE EXISTING DOMESTIC STOCK IN RUGELEY TOWN AND PROPOSED NEW BUILD DOMESTIC DEVELOPMENTS

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Subject	*Analysis of the existing domestic stock in Rugeley Town and proposed new build domestic developments*
Description	*Analysis of the existing domestic stock in Rugeley Town and proposed new build domestic developments – to be used to understand the composition of the main types of housing stock and create pathways to create low carbon housing.*
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Zero Carbon Rugeley: Executive Summary

version 1.0
20th October 2020

parity projects

ABOUT PARITY PROJECTS

Parity is an award-winning provider of environmental and energy solutions to the residential building sector. We help our customers identify the most effective ways to reduce the energy impact of their properties.

The backbone of our work is the use of computer modelling **Pathways™** and **Portfolio™** to identify the most appropriate measures for properties based on cost estimates and building physics.

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1.0	CJN	26/10/20	Provided to DS for comment
1.1	CJN	03/11/20	

Distribution (all versions):

- SHAP
- Parity (internal)

Table of contents

Disclaimer

The conclusions in this report are based on the data available. To be able to conduct the analysis, this may have had to be partially interpolated to fill gaps.

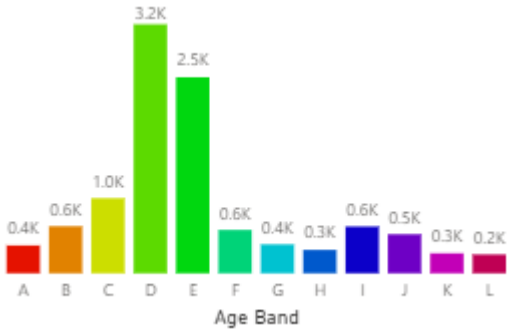
As housing analysts, we would suggest that even a complete and recent housing dataset, if large, cannot be guaranteed to be free from errors.

1 Baseline

The following charts and comments bring out some of the highlights of the **10,570** properties in the Zero Carbon Rugeley area.

1.1 PROPERTY AGE

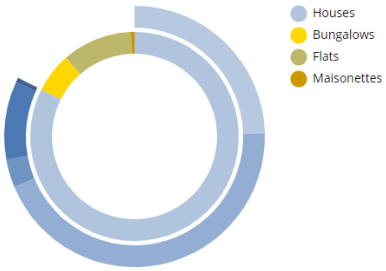
Mid-century properties make up the bulk of the properties, this is high for this age bracket as nationally there are more older properties, especially in established cities.



A: Pre 1900	Predominately solid brick or stone until 1930s
B: 1900-1929	
C: 1930-1949	Cavity walls become the standard
D: 1950-1966	System builds are common
E: 1967-1975	System builds are common
F: 1976-1982	
G: 1983-1990	Cavities are built with insulation from this point on
H: 1991-1995	Age bands from here on reflect update to Building Regs
I: 1996-2002	
J: 2003-2006	
K: 2007-2011	
L: 2012 onwards	

1.2 PROPERTY TYPE

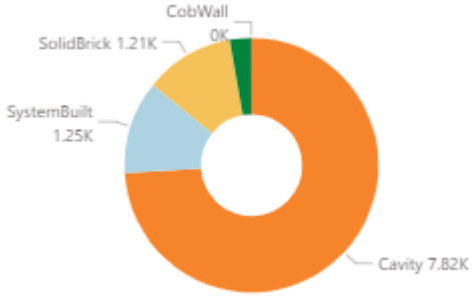
Houses, and specifically semi-detached houses dominate which is to be expected outside of city centres.



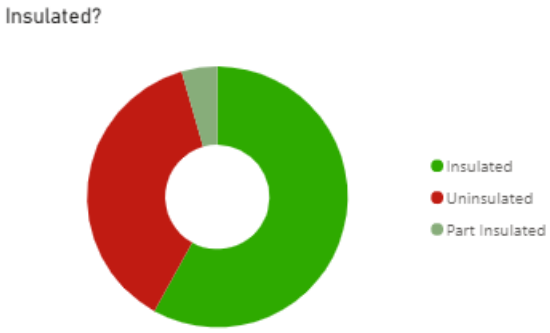
Houses	8,971
Flats	977
Bungalows	561
Maisonettes	57

1.3 WALL TYPE

The high proportion of cavity walls, and relatively high proportion of system built walls reflects the property ages. There appear to be quite a few uninsulated cavities (*As Built Pre 1976* and *As Built 1976-1982*).

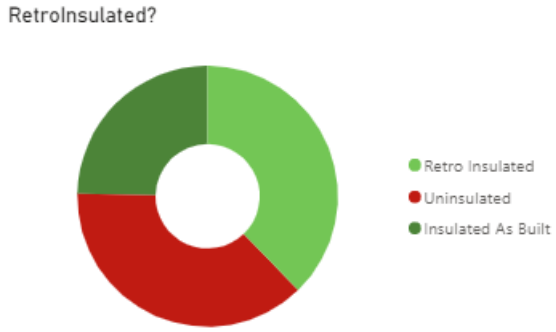


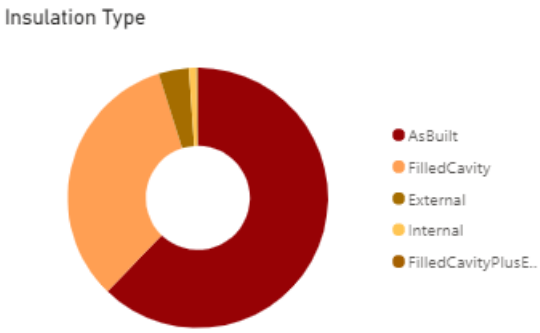
Cavity	7,964
Solid	1,207
System Built	1,250
Timber Frame	285
Sandstone or Limestone	3
Cob	0



Here we show the proportion of walls that are insulated and uninsulated.

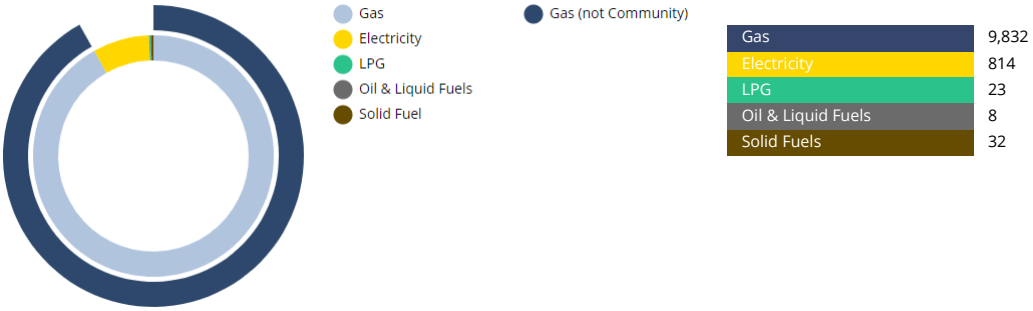
Most of the insulated walls have been insulated since they were built i.e. undergone cavity filling.



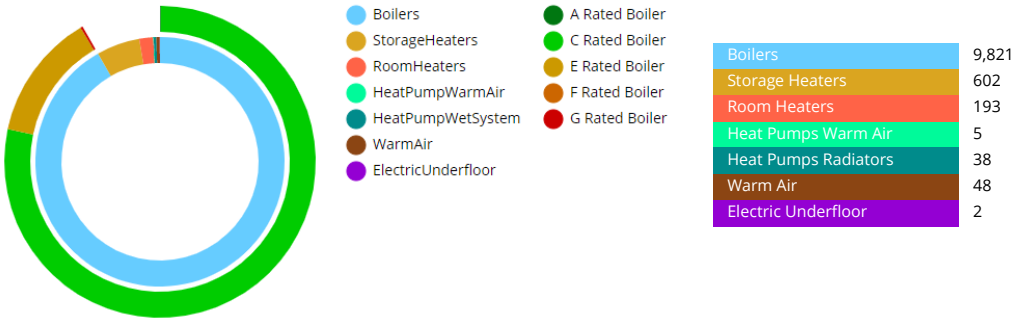


1.4 MAIN HEATING FUEL & SYSTEM

As expected, where there is a gas network available, this is used as the main heating fuel due to its convenience and price.



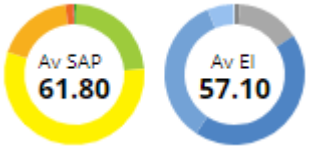
Where gas is available it also lends itself to gas boilers and a radiator central heating system. Condensing boilers have been around for 20 years and so it is expected that most of the boilers will be reasonably efficient. The electricity systems are mainly storage heaters.



1.5 SAP, EI, CO_2 & BILLS SCORE

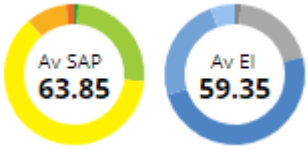
The SAP score is a measure of energy efficiency, based on fuel bill, and the EI score is based on CO_2 emissions. In both cases, the higher the rating, the more efficient the home.

Total



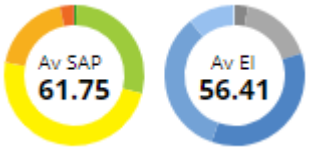
Average tCO_2 per home: 4.33
Average £ bill per home: £856
Average heating £ bill per home: £781

Socially Rented



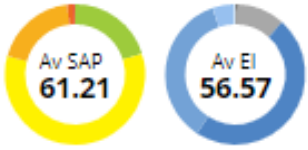
Average tCO_2 per home: 3.55
Average £ bill per home: £706
Average heating £ bill per home: £646

Private Rented

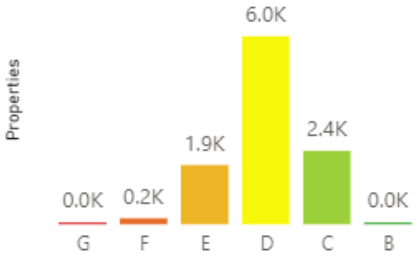


Average tCO_2 per home: 3.91
Average £ bill per home: £758
Average heating £ bill per home: £694

Owner Occupied



Average tCO_2 per home: 4.49
Average £ bill per home: £889
Average heating £ bill per home: £812



	Total	Socially Rented	Private Rented	Owner Occupied
G	22	0	1	6
F	193	20	22	50
E	1,905	102	134	592
D	6,044	677	349	1,843
C	2,362	279	204	629
B	40	10	4	2
A	0	0	0	0
		1,088	**714**	**3,122**
		(10%)	**(7%)**	**(30%)**

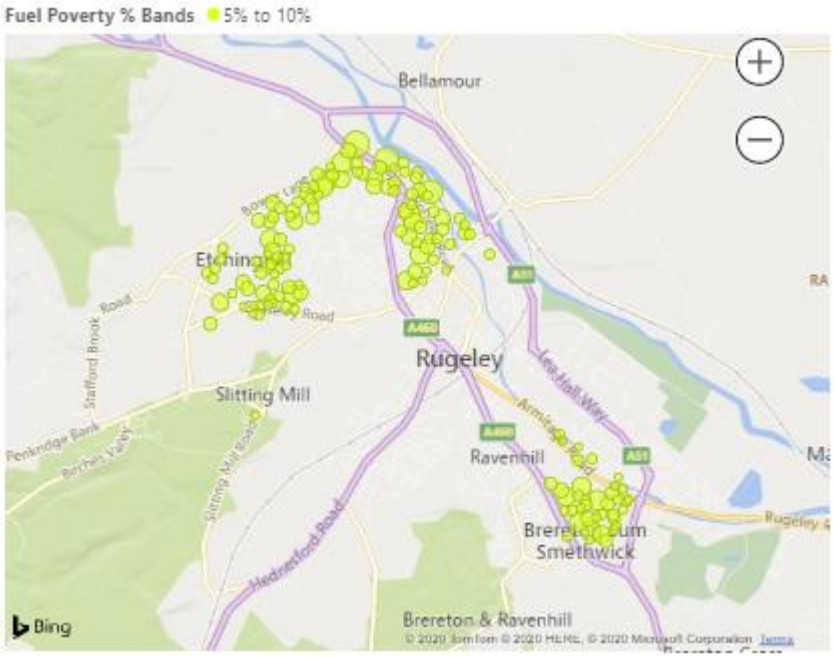
The tenure information is mainly taken from the OpenEPC data so lacks both coverage and accuracy. This is the reason behind the % in the table above being roughly 50%.

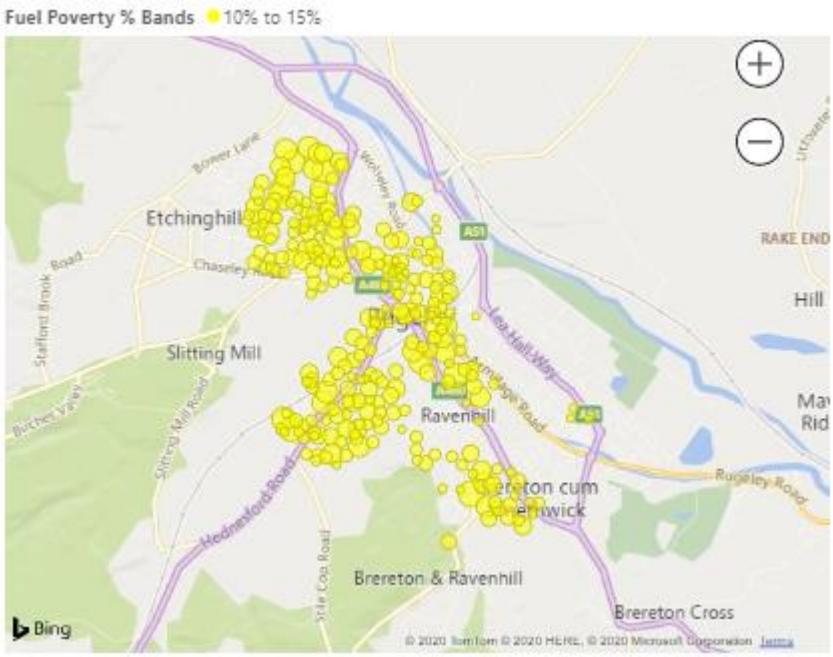
1.6 SOCIO-ECONOMIC INDICATORS

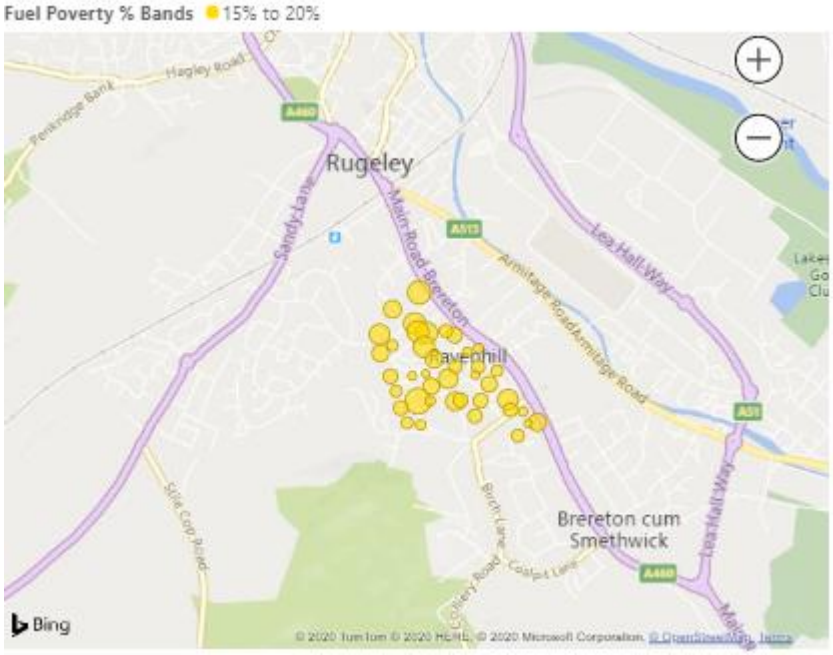
Socio-economic factors could have a variety of effects when it comes to retrofit. Firstly they may indicate neighbourhoods that are more at risk of negative health impacts due to underheating homes and associated damp issues – this may be caused by both poor quality housing and/or povety restricting expenditure on heating. The second may indicate the inability for households to materially change their situation due to lack of capital, or ability to access grants restricting the retrofit they are able to afford.

1.6.1 Fuel Poverty

All the LSOAs in the area have predicted fuel poverty rates between 5% and 20%. As a comparison the most affluent areas of the country have below 5% and some areas of high depravation have upwards of 30%. The following maps show circles for postcodes colour coded by the incidences of Fuel Poverty expected. The size of the circles relates to the number of properties in the postcode. There is a picture of a property from the area, although for all but 15% to 20% there will be a very large variety.



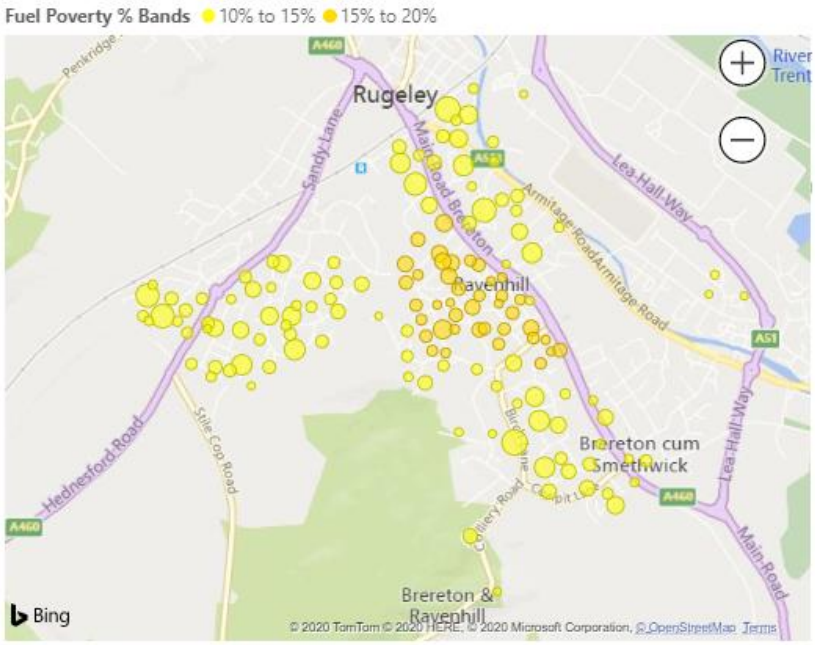




The area of highest expected fuel poverty incidence is very closely centred on a few streets in the Ravenhill area.

1.6.2 Disability Living Allowance

Top 4 LSOAs by Disability Living Allowance. These may indicate areas where householders require higher heating levels, struggle to access available grant funding or have lower disposable incomes.



1.6.3 Benefits

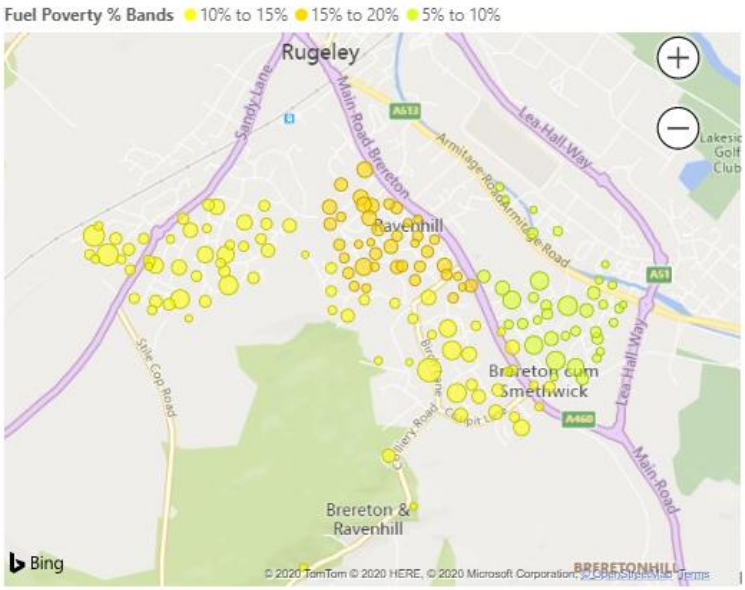
Benefits claimant data was only available at the Ward level and the Wards tend to cross socio-economically different areas e.g. Brereton & Ravenhill. All Wards show a percentage claimant count below the regional average, which itself is also below the national average.

1.6.4 Health

Health data again is provided at the Ward level and so provides limited insight. The only major variance is that Etching Hill & The Heath Ward has the lowest incidences of emergency admissions.

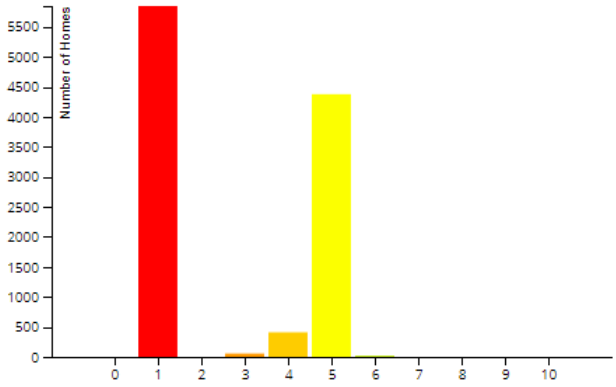
1.6.5 Index of Multiple Deprivation

The map below shows the locations of the 4 most deprived areas by Index of Multiple Deprivation score. Again these can indicate higher needs and lower ability to act on those needs.



1.7 DATA CONFIDENCE

The graph below shows the aggregate data confidence scores. Behind this are some more nuanced scores but the confidence can broadly be broken down into those that have some OpenEPC data available and those that don't.



1.8 TYPOLOGIES

Part of the brief is to identify up to 8 statistically significant typologies. Based on the charts above, we decided to break the properties down in terms of Age, Property Type, Wall Construction and Heating Type. The following 9 archetypes were found to be the most common and we propose substituting number 9 for number 8 to enable a variation in Heating Type.

	Age	Property Type	Wall	Heating Type	No.	% of stock	Cumulative %	Included
1	1950-1982	House	Cavity	Gas Boiler	4,216	39.9	39.9	Y
2	1983-2002	House	Cavity	Gas Boiler	903	8.5	48.4	Y
3	1950-1982	House	System	Gas Boiler	839	7.9	56.3	Y
4	2003+	House	Cavity	Gas Boiler	718	6.8	63.1	Y
5	Pre 1929	House	Solid	Gas Boiler	232	2.2	65.3	Y
6	1930-1949	House	Cavity	Gas Boiler	469	4.4	69.8	Y
7	1950-1982	Bungalow	Cavity	Gas Boiler	417	3.9	73.7	Y
8	1930-1949	House	System	Gas Boiler	192	1.8	-	N
9	1983-2002	Flat	Cavity	Storage Heaters	146	1.4	75.1	Y

Once the final typologies have been agreed Pathways can be easily filtered to give address lists.

1.8.1 Typology Examples

1

2

3

4

5

6

7

9

1.9 PATHWAYS SUMMARY

Pathways uses the latest figures on measures, their performance and pricing to calculate the least cost route to delivering a minimum EPC or SAP score of C for every property in the borough, and to minimize carbon emissions.

Table 1: The cost and benefit of the SAP C and Net Zero Pathways

Pathway Name	1: SAP C	2: Net Zero CO_2 with Solar
Total Cost	£26.5 Million	£398.3 Million
Average Cost Per Home Affected	£3,250	£37,270
Mean Tonnes of CO_2 Following Investment	3.14	0.40

1.9.1 Pathways Setup

Here we outline the target(s), variables and measures considered in the two Pathways. The second one has 3 steps that are carried out one after the other.

Pathway 1: SAP C

Step	Target	Measures Considered	Measures Excluded
1	SAP C (69)	All except those excluded e.g. Fabric measures (cavity, internal and external wall insulation, roof and floor insulation, windows, doors, draughtproofing, heating systems and renewables.	Narrow cavity wall High exposure cavity wall Gas heating where there is currently no gas in the property Community heating from individual heating

Pathway 2: Net Zero CO_2 with Solar

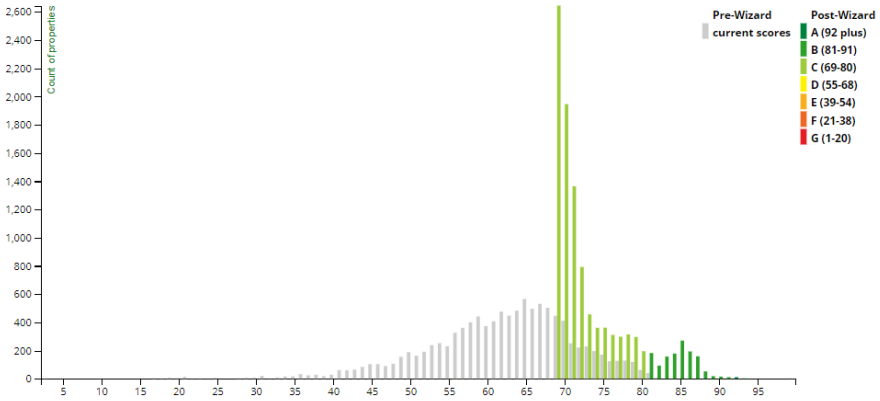
Step	Target	Measures Considered	Measures Excluded
1	Zero CO_2 using 2038 grid intensities	Triple glazing Other fabric measures Air Source Heat Pumps Ground Source Heat Pumps Removing secondary heating	External wall insulation PV Biomass boilers Community heating from individual heating
2	Zero CO_2 using 2038 grid intensities	Solar PV facing south east with no shading Solar PV where a size has been determined	All other measures
3	Zero CO_2 using 2038 grid intensities	Vertical PV and conservation area PV	All other measures

1.9.2 Summary of Measures in each Pathway

Pathway 1: SAP C	
Fabric Total	4,355 measures - £5.2M
Walls	2,175 measures - £3.6M
Roofs	1,510 measures - £1.2M
Floors	69 measures - £183K
Glazing	12 measures - £45K
Ventilation	8 measures - £10K
Heating and Hot Water	14,208 measures - £7.9M
Lighting	6,795 measures - £444K
Photovoltaics	2,790 measures - £13M

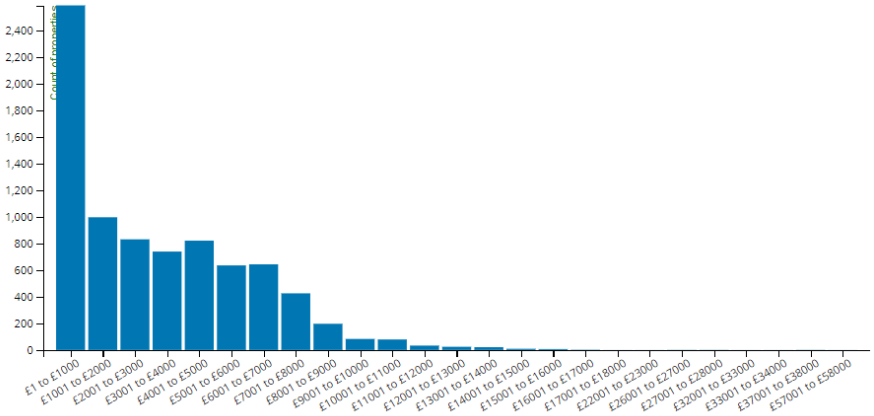
Revised SAP Profile

The grey bars show the profile of the housing before the Pathway and the colour bars show what it would look like if all the measures identified by the Pathway were installed.



Investment Breakdown

The bars show the number of properties in given buckets of total investment identified in the Pathway, i.e. the most common investment per property is below £1,000.

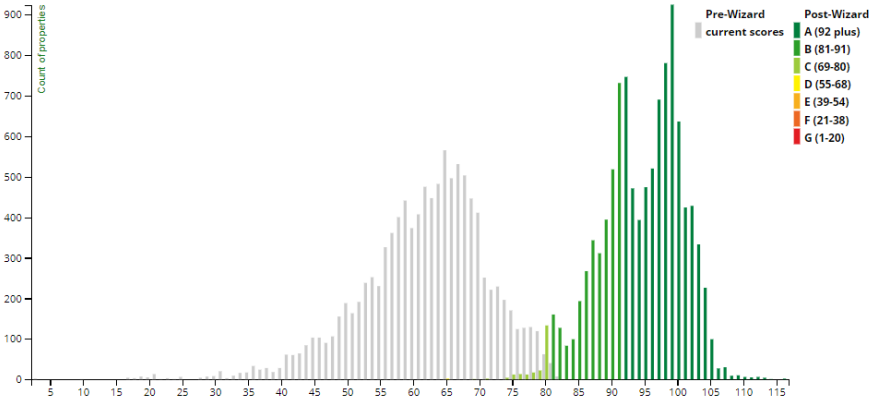


Pathway 2: Net Zero CO_2 with Solar

Fabric Total	45,658 measures - £260M
Walls	9,529 measures - £134M
Roofs	8,407 measures - £5.9M
Floors	8,395 measures - £15.6M
Glazing	19,327 measures - £104M
Heating and Hot Water	28,850 measures - £91M
Lighting	571 measures - £30K
Photovoltaics	10,301 measures - £48M

Revised SAP Profile

The grey bars show the profile of the housing before the scenario and the colour bars show what it would look like if all the measures identified by the scenario were installed.



Investment Breakdown

The bars show the number of properties in given buckets of total investment identified in the Pathway, i.e. the most common investment per property is around £37,500.