



# Regional scale modelling Cardiff City Region Annex

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Retrofit 2050 Working Paper

October 2013



Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	Total
<b>Blaenau Gwent</b>	0.16	0.17	0.20	0.34	0.02	0.08	0.12	0.15	2.48	0.24	0.06		0.31	0.21	0.03	0.21	<b>5</b>
<b>Bridgend</b>	0.30	0.34	0.39	0.69	0.06	0.13	0.64	0.23	4.24	0.30	0.14		0.62	0.42	0.06	0.42	<b>9</b>
<b>Caerphilly</b>	0.42	0.41	0.48	0.47	0.10	0.27	0.37	0.76	4.54	0.25	0.16		0.76	0.51	0.08	0.51	<b>10</b>
<b>Cardiff</b>	1.07	1.19	1.02	1.34	0.23	0.62	0.62	0.92	9.37	0.35	0.58	8.03	1.61	1.10	0.16	1.07	<b>29</b>
<b>Merthyr Tydfil</b>	0.41	0.11	0.15	0.27	0.04	0.12	0.15	0.36	1.22	0.08	0.05		0.24	0.16	0.02	0.16	<b>4</b>
<b>Monmouthshire</b>	0.57	0.18	0.26	0.31	0.04	0.23	0.41	0.61	5.65	0.41	0.21	3.73	0.40	0.28	0.04	0.27	<b>14</b>
<b>Neath Port Talbot</b>	0.39	0.46	0.41	0.58	0.16	0.35	0.31	0.55	4.43	0.27	0.16		0.65	0.45	0.06	0.44	<b>10</b>
<b>Newport</b>	0.57	0.35	0.38	0.65	0.07	0.32	0.37	0.69	8.30	0.72	0.29	4.24	0.60	0.41	0.06	0.41	<b>18</b>
<b>Rhondda, Cynon, Taff</b>	0.76	0.52	0.63	1.01	0.09	0.35	0.70	0.56	4.87	0.45	0.17		0.99	0.67	0.10	0.67	<b>13</b>
<b>Swansea</b>	1.65	0.57	0.68	1.66	0.11	0.47	1.27	1.09	7.31	0.40	0.34		1.07	0.72	0.11	0.71	<b>18</b>
<b>The Vale of Glamorgan</b>	0.51	0.27	0.36	0.79	0.07	0.27	0.48	0.55	6.39	0.39	0.27	4.89	0.56	0.38	0.06	0.38	<b>17</b>
<b>Torfaen</b>	0.51	0.22	0.24	0.35	0.04	0.14	0.27	0.22	3.14	0.21	0.12		0.37	0.25	0.04	0.25	<b>6</b>
<b>Total</b>	<b>7.32</b>	<b>4.78</b>	<b>5.19</b>	<b>8.45</b>	<b>1.04</b>	<b>3.33</b>	<b>5.71</b>	<b>6.68</b>	<b>61.94</b>	<b>4.06</b>	<b>2.54</b>	<b>20.88</b>	<b>8.19</b>	<b>5.56</b>	<b>0.81</b>	<b>5.50</b>	<b>152</b>

**Table A.1 :** Absolute savings kton CO2 / year by 2022. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post 83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	Total from all measures
Blaenau Gwent	5.0	5.2	6.2	10.6	0.7	2.5	3.7	4.8	78.2	7.5	2.0		9.8	6.7	1.0	6.6	151
Bridgend	4.9	5.6	6.5	11.5	1.0	2.2	10.7	3.9	70.4	5.0	2.3		10.3	7.0	1.0	6.9	149
Caerphilly	5.4	5.3	6.3	6.2	1.3	3.6	4.8	9.9	59.2	3.2	2.1		9.9	6.6	1.0	6.7	131
Cardiff	7.6	8.4	7.2	9.5	1.6	4.4	4.4	6.5	66.2	2.5	4.1	56.7	11.4	7.8	1.1	7.6	207
Merthyr Tydfil	15.7	4.4	5.8	10.5	1.5	4.5	5.7	14.0	47.1	3.0	1.8		9.2	6.2	0.9	6.2	136
Monmouthshire	14.7	4.5	6.6	8.0	1.0	5.8	10.6	15.5	144.8	10.4	5.5	95.4	10.4	7.1	1.0	6.9	348
Neath Port Talbot	6.1	7.3	6.6	9.1	2.6	5.5	4.9	8.6	70.1	4.2	2.5		10.4	7.1	1.0	7.0	153
Newport	9.2	5.7	6.2	10.5	1.1	5.1	5.9	11.1	134.0	11.6	4.6	68.4	9.7	6.6	1.0	6.6	297
Rhondda, Cynon, Taff	7.2	5.0	6.0	9.6	0.9	3.3	6.7	5.3	46.4	4.3	1.6		9.4	6.4	0.9	6.4	119
Swansea	15.5	5.3	6.4	15.6	1.1	4.4	11.9	10.2	68.5	3.8	3.2		10.0	6.8	1.0	6.7	170
The Vale of Glamorgan	9.5	5.0	6.6	14.5	1.3	4.9	8.9	10.1	117.7	7.2	5.0	89.9	10.4	7.0	1.0	7.0	306
Torfaen	12.7	5.5	5.9	8.7	0.9	3.4	6.8	5.4	78.6	5.4	2.9		9.3	6.3	0.9	6.3	159
Average per measure	9.1	5.9	6.4	10.5	1.3	4.1	7.1	8.3	76.8	5.0	3.2	25.9	10.2	6.9	1.0	6.8	189

**Table A.2 :** Emission savings normalised by the size of the local authority (number of households). Savings in kg CO2 / household / year by 2022. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :** Maximum 5 4 3 2 1 Minimum

Five colour scale from maximum (red) to minimum (green) values  
Colour coded per column i.e. where is the measure most effective per instance.

## Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance
<b>Blaenau Gwent</b>	397	148	133	561	245	148	102	75	539	287	159		198	88	34	417
<b>Bridgend</b>	400	149	134	564	247	149	103	75	542	288	160		199	88	34	418
<b>Caerphilly</b>	399	149	134	564	246	149	103	75	541	288	160		199	88	34	418
<b>Cardiff</b>	404	150	135	570	249	151	104	76	547	291	161	1602	201	89	34	416
<b>Merthyr Tydfil</b>	398	148	133	562	246	149	102	75	540	287	159		199	88	34	417
<b>Monmouthshire</b>	409	152	137	578	253	153	105	77	555	295	164	1624	204	90	34	421
<b>Neath Port Talbot</b>	402	149	134	567	248	150	103	75	545	290	161		200	89	34	419
<b>Newport</b>	400	149	134	565	247	149	103	75	543	289	160	1589	200	88	34	418
<b>Rhondda, Cynon, Taff</b>	399	148	133	563	246	149	102	75	541	287	159		199	88	34	417
<b>Swansea</b>	403	150	135	568	248	150	103	76	546	290	161		201	89	34	419
<b>The Vale of Glamorgan</b>	402	149	134	567	248	150	103	75	545	290	161	1595	200	89	34	419
<b>Torfaen</b>	399	149	133	563	246	149	103	75	541	288	160		199	88	34	418
<b>Average per measure</b>	402	149	134	566	248	150	103	75	545	290	161	1602	200	89	34	418

**Table A.3 :** Emission savings normalised by instances of the measure per LA. Savings in kg CO<sub>2</sub> / instance / year by 2022. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :**  5  4  3  2  1

Five colour scale from maximum (red) to minimum (green) values  
Colour coded per row i.e. which measure most effective per local authority.

## Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	Total
<b>Blaenau Gwent</b>	3%	3%	4%	7%	0%	2%	2%	3%	52%	5%	1%		6%	4%	1%	4%	<b>100%</b>
<b>Bridgend</b>	3%	4%	4%	8%	1%	1%	7%	3%	47%	3%	2%		7%	5%	1%	5%	<b>100%</b>
<b>Caerphilly</b>	4%	4%	5%	5%	1%	3%	4%	8%	45%	2%	2%		8%	5%	1%	5%	<b>100%</b>
<b>Cardiff</b>	4%	4%	3%	5%	1%	2%	2%	3%	32%	1%	2%	27%	5%	4%	1%	4%	<b>100%</b>
<b>Merthyr Tydfil</b>	12%	3%	4%	8%	1%	3%	4%	10%	35%	2%	1%		7%	5%	1%	5%	<b>100%</b>
<b>Monmouthshire</b>	4%	1%	2%	2%	0%	2%	3%	4%	42%	3%	2%	27%	3%	2%	0%	2%	<b>100%</b>
<b>Neath Port Talbot</b>	4%	5%	4%	6%	2%	4%	3%	6%	46%	3%	2%		7%	5%	1%	5%	<b>100%</b>
<b>Newport</b>	3%	2%	2%	4%	0%	2%	2%	4%	45%	4%	2%	23%	3%	2%	0%	2%	<b>100%</b>
<b>Rhondda, Cynon, Taff</b>	6%	4%	5%	8%	1%	3%	6%	4%	39%	4%	1%		8%	5%	1%	5%	<b>100%</b>
<b>Swansea</b>	9%	3%	4%	9%	1%	3%	7%	6%	40%	2%	2%		6%	4%	1%	4%	<b>100%</b>
<b>The Vale of Glamorgan</b>	3%	2%	2%	5%	0%	2%	3%	3%	38%	2%	2%	29%	3%	2%	0%	2%	<b>100%</b>
<b>Torfaen</b>	8%	3%	4%	5%	1%	2%	4%	3%	49%	3%	2%		6%	4%	1%	4%	<b>100%</b>
<b>Cardiff City Region</b>	5%	3%	3%	6%	1%	2%	4%	4%	41%	3%	2%	14%	5%	4%	1%	4%	<b>100%</b>

**Table A.4 :** Contribution of each measure to the savings total for each local authority. Percentages based on absolute values. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :**  5  4  3  2  1

Five colour scale from maximum (red) to minimum (green) values  
Colour coding per row i.e. which measure offers the greatest reduction per local authority.

Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	Share of CCR savings from all measures
Blaenau Gwent	2%	3%	4%	4%	2%	2%	2%	2%	4%	6%	2%		4%	4%	4%	4%	3%
Bridgend	4%	7%	8%	8%	6%	4%	11%	3%	7%	7%	5%		8%	8%	8%	8%	6%
Caerphilly	6%	8%	9%	6%	10%	8%	6%	11%	7%	6%	6%		9%	9%	9%	9%	7%
Cardiff	15%	25%	20%	16%	22%	19%	11%	14%	15%	9%	23%	38%	20%	20%	19%	20%	19%
Merthyr Tydfil	6%	2%	3%	3%	4%	3%	3%	5%	2%	2%	2%		3%	3%	3%	3%	2%
Monmouthshire	8%	4%	5%	4%	4%	7%	7%	9%	9%	10%	8%	18%	5%	5%	5%	5%	9%
Neath Port Talbot	5%	10%	8%	7%	16%	10%	5%	8%	7%	7%	6%		8%	8%	8%	8%	6%
Newport	8%	7%	7%	8%	6%	10%	6%	10%	13%	18%	11%	20%	7%	7%	7%	7%	12%
Rhondda, Cynon, Taff	10%	11%	12%	12%	9%	10%	12%	8%	8%	11%	6%		12%	12%	12%	12%	8%
Swansea	23%	12%	13%	20%	11%	14%	22%	16%	12%	10%	13%		13%	13%	13%	13%	12%
The Vale of Glamorgan	7%	6%	7%	9%	7%	8%	8%	8%	10%	10%	11%	23%	7%	7%	7%	7%	11%
Torfaen	7%	5%	5%	4%	4%	4%	5%	3%	5%	5%	5%		5%	5%	5%	5%	4%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table A.5 :** Share of the potential for savings per measure located in each local authority. Percentages based on absolute values. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :** Maximum 5 4 3 2 1 Minimum

Five colour scale from maximum (red) to minimum (green) values  
 Colour coded per column i.e. which local authority has the greatest reduction potential per measure.

## Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	Total
<b>Blaenau Gwent</b>	402	1117	1475	599	94	538	1153	2054	4593	825	399		1563	2412	912	505	<b>18639</b>
<b>Bridgend</b>	739	2269	2934	1222	252	902	6247	3112	7813	1041	868		3109	4807	1814	995	<b>38125</b>
<b>Caerphilly</b>	1045	2727	3591	840	411	1831	3559	10073	8375	853	988		3805	5747	2220	1222	<b>47285</b>
<b>Cardiff</b>	2657	7893	7537	2356	930	4137	5948	12153	17116	1193	3615	5010	7986	12317	4660	2583	<b>98091</b>
<b>Merthyr Tydfil</b>	1021	772	1128	483	156	778	1445	4842	2259	270	286		1195	1816	698	383	<b>17532</b>
<b>Monmouthshire</b>	1403	1151	1870	538	158	1486	3925	7880	10186	1383	1309	2295	1982	3063	1156	643	<b>40427</b>
<b>Neath Port Talbot</b>	964	3075	3082	1015	658	2323	2967	7231	8123	923	972		3266	5033	1906	1048	<b>42586</b>
<b>Newport</b>	1430	2380	2851	1146	268	2128	3547	9149	15287	2489	1785	2667	3020	4644	1762	976	<b>55527</b>
<b>Rhondda, Cynon, Taff</b>	1897	3508	4700	1795	381	2335	6867	7446	9017	1573	1036		4980	7632	2906	1598	<b>57672</b>
<b>Swansea</b>	4101	3814	5038	2924	454	3098	12311	14398	13391	1392	2122		5338	8150	3115	1704	<b>81348</b>
<b>The Vale of Glamorgan</b>	1280	1830	2661	1385	276	1779	4684	7261	11734	1350	1706	3064	2820	4321	1645	906	<b>48702</b>
<b>Torfaen</b>	1275	1468	1766	615	154	918	2652	2893	5800	743	735		1871	2859	1091	601	<b>25442</b>
<b>Total</b>	<b>18214</b>	<b>32005</b>	<b>38634</b>	<b>14918</b>	<b>4191</b>	<b>22252</b>	<b>55304</b>	<b>88491</b>	<b>113695</b>	<b>14034</b>	<b>15821</b>	<b>13037</b>	<b>40934</b>	<b>62800</b>	<b>23884</b>	<b>13163</b>	<b>571378</b>

**Table A.6 :** Absolute figures of cost effective retrofit instances per measure for each local authority. Number of homes receiving the measure. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :**  5  4  3  2  1

Five colour scale from maximum (red) to minimum (green) values  
Colour coded per column i.e. where is the greatest number of homes to be retrofitted.

## Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre'76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance
<b>Blaenau Gwent</b>	1.3%	3.5%	4.7%	1.9%	0.3%	1.7%	3.6%	6.5%	14.5%	2.6%	1.3%		4.9%	7.6%	2.9%	1.6%
<b>Bridgend</b>	1.2%	3.8%	4.9%	2.0%	0.4%	1.5%	10.4%	5.2%	13.0%	1.7%	1.4%		5.2%	8.0%	3.0%	1.7%
<b>Caerphilly</b>	1.4%	3.6%	4.7%	1.1%	0.5%	2.4%	4.6%	13.1%	10.9%	1.1%	1.3%		5.0%	7.5%	2.9%	1.6%
<b>Cardiff</b>	1.9%	5.6%	5.3%	1.7%	0.7%	2.9%	4.2%	8.6%	12.1%	0.8%	2.6%	3.5%	5.6%	8.7%	3.3%	1.8%
<b>Merthyr Tydfil</b>	3.9%	3.0%	4.4%	1.9%	0.6%	3.0%	5.6%	18.7%	8.7%	1.0%	1.1%		4.6%	7.0%	2.7%	1.5%
<b>Monmouthshire</b>	3.6%	2.9%	4.8%	1.4%	0.4%	3.8%	10.0%	20.2%	26.1%	3.5%	3.4%	5.9%	5.1%	7.8%	3.0%	1.6%
<b>Neath Port Talbot</b>	1.5%	4.9%	4.9%	1.6%	1.0%	3.7%	4.7%	11.5%	12.9%	1.5%	1.5%		5.2%	8.0%	3.0%	1.7%
<b>Newport</b>	2.3%	3.8%	4.6%	1.8%	0.4%	3.4%	5.7%	14.8%	24.7%	4.0%	2.9%	4.3%	4.9%	7.5%	2.8%	1.6%
<b>Rhondda, Cynon, Taff</b>	1.8%	3.3%	4.5%	1.7%	0.4%	2.2%	6.5%	7.1%	8.6%	1.5%	1.0%		4.7%	7.3%	2.8%	1.5%
<b>Swansea</b>	3.8%	3.6%	4.7%	2.7%	0.4%	2.9%	11.5%	13.5%	12.5%	1.3%	2.0%		5.0%	7.6%	2.9%	1.6%
<b>The Vale of Glamorgan</b>	2.4%	3.4%	4.9%	2.5%	0.5%	3.3%	8.6%	13.4%	21.6%	2.5%	3.1%	5.6%	5.2%	8.0%	3.0%	1.7%
<b>Torfaen</b>	3.2%	3.7%	4.4%	1.5%	0.4%	2.3%	6.6%	7.2%	14.5%	1.9%	1.8%		4.7%	7.2%	2.7%	1.5%
<b>Cardiff City Region</b>	<b>2.3%</b>	<b>4.0%</b>	<b>4.8%</b>	<b>1.9%</b>	<b>0.5%</b>	<b>2.8%</b>	<b>6.9%</b>	<b>11.0%</b>	<b>14.1%</b>	<b>1.7%</b>	<b>2.0%</b>	<b>1.6%</b>	<b>5.1%</b>	<b>7.8%</b>	<b>3.0%</b>	<b>1.6%</b>

**Table A.7 :** Share of the stock that is cost-effective to retrofit per measure. Each home may receive multiple measures. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :**  5  4  3  2  1

Five colour scale from maximum (red) to minimum (green) values  
Colour coded per row i.e. which measure has the greater potential per local authority.



Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	Total
Blaenau Gwent	£6,255	£5,745	£737,363	£178,799	£21,759	£110,101	£195,526	£548,995	£1,920,330	£355,352	£169,604		£271,801	£277,096	£30,327	£223,644	<b>£5,052,697</b>
Bridgend	£11,515	£11,667	£1,467,120	£364,675	£58,110	£184,610	£1,059,306	£831,774	£3,266,717	£448,547	£368,612		£540,800	£552,405	£60,341	£441,130	<b>£9,667,327</b>
Caerphilly	£16,274	£14,019	£1,795,546	£250,577	£94,824	£374,734	£603,487	£2,692,669	£3,501,807	£367,314	£419,518		£661,862	£660,350	£73,849	£541,657	<b>£12,068,486</b>
Cardiff	£41,392	£40,576	£3,768,737	£703,234	£214,717	£846,633	£1,008,622	£3,248,709	£7,156,512	£513,874	£1,535,326	£34,497,834	£1,389,206	£1,415,236	£155,003	£1,144,785	<b>£57,680,395</b>
Merthyr Tydfil	£15,899	£3,970	£564,130	£144,162	£36,036	£159,283	£245,011	£1,294,351	£944,393	£116,289	£121,529		£207,946	£208,651	£23,202	£169,974	<b>£4,254,827</b>
Monmouthshire	£21,856	£5,918	£935,147	£160,472	£36,436	£304,158	£665,477	£2,106,571	£4,258,849	£595,569	£555,856	£15,800,158	£344,707	£352,008	£38,461	£284,784	<b>£26,466,426</b>
Neath Port Talbot	£15,014	£15,806	£1,541,139	£302,822	£152,058	£475,399	£503,076	£1,933,064	£3,396,459	£397,667	£413,022		£568,084	£578,320	£63,385	£464,349	<b>£10,819,664</b>
Newport	£22,272	£12,237	£1,425,258	£342,016	£61,801	£435,433	£601,544	£2,445,654	£6,391,547	£1,071,968	£758,141	£18,363,748	£525,369	£533,589	£58,619	£432,475	<b>£33,481,670</b>
Rhondda, Cynon, Taff	£29,547	£18,034	£2,350,185	£535,715	£88,026	£477,831	£1,164,461	£1,990,533	£3,770,296	£677,550	£440,219		£866,309	£876,976	£96,660	£708,157	<b>£14,090,501</b>
Swansea	£63,876	£19,605	£2,519,047	£872,754	£104,911	£634,028	£2,087,485	£3,848,782	£5,598,854	£599,422	£901,334		£928,554	£936,433	£103,605	£755,061	<b>£19,973,753</b>
The Vale of Glamorgan	£19,943	£9,407	£1,330,629	£413,301	£63,827	£364,070	£794,182	£1,941,048	£4,905,978	£581,585	£724,542	£21,098,291	£490,487	£496,515	£54,727	£401,576	<b>£33,690,109</b>
Torfaen	£19,865	£7,548	£882,766	£183,596	£35,553	£187,947	£449,709	£773,454	£2,425,246	£319,955	£312,264		£325,399	£328,495	£36,307	£266,368	<b>£6,554,471</b>
<b>Total</b>	<b>£283,709</b>	<b>£164,530</b>	<b>£19,317,066</b>	<b>£4,452,121</b>	<b>£968,057</b>	<b>£4,554,227</b>	<b>£9,377,887</b>	<b>£23,655,605</b>	<b>£47,536,989</b>	<b>£6,045,093</b>	<b>£6,719,968</b>	<b>£89,760,031</b>	<b>£7,120,523</b>	<b>£7,216,072</b>	<b>£794,487</b>	<b>£5,833,960</b>	<b>£233,800,326</b>

**Table A.8 :** Absolute figures of the investment estimated per local authority for the implementation of cost- effective measures. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

## Retrofit 2050

	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	Average per property
<b>Blaenau Gwent</b>	£0.2	£0.2	£23.3	£5.6	£0.7	£3.5	£6.2	£17.3	£60.7	£11.2	£5.4		£8.6	£8.8	£1.0	£7.1	£160
<b>Bridgend</b>	£0.2	£0.2	£24.4	£6.1	£1.0	£3.1	£17.6	£13.8	£54.3	£7.5	£6.1		£9.0	£9.2	£1.0	£7.3	£161
<b>Caerphilly</b>	£0.2	£0.2	£23.4	£3.3	£1.2	£4.9	£7.9	£35.1	£45.7	£4.8	£5.5		£8.6	£8.6	£1.0	£7.1	£158
<b>Cardiff</b>	£0.3	£0.3	£26.6	£5.0	£1.5	£6.0	£7.1	£23.0	£50.6	£3.6	£10.9	£243.8	£9.8	£10.0	£1.1	£8.1	£408
<b>Merthyr Tydfil</b>	£0.6	£0.2	£21.8	£5.6	£1.4	£6.1	£9.5	£49.9	£36.4	£4.5	£4.7		£8.0	£8.0	£0.9	£6.6	£164
<b>Monmouthshire</b>	£0.6	£0.2	£23.9	£4.1	£0.9	£7.8	£17.0	£53.9	£109.0	£15.2	£14.2	£404.6	£8.8	£9.0	£1.0	£7.3	£678
<b>Neath Port Talbot</b>	£0.2	£0.3	£24.4	£4.8	£2.4	£7.5	£8.0	£30.6	£53.8	£6.3	£6.5		£9.0	£9.2	£1.0	£7.4	£171
<b>Newport</b>	£0.4	£0.2	£23.0	£5.5	£1.0	£7.0	£9.7	£39.5	£103.2	£17.3	£12.2	£296.4	£8.5	£8.6	£0.9	£7.0	£540
<b>Rhondda, Cynon, Taff</b>	£0.3	£0.2	£22.4	£5.1	£0.8	£4.6	£11.1	£19.0	£35.9	£6.5	£4.2		£8.3	£8.4	£0.9	£6.7	£134
<b>Swansea</b>	£0.6	£0.2	£23.6	£8.2	£1.0	£5.9	£19.5	£36.0	£52.4	£5.6	£8.4		£8.7	£8.8	£1.0	£7.1	£187
<b>The Vale of Glamorgan</b>	£0.4	£0.2	£24.5	£7.6	£1.2	£6.7	£14.6	£35.7	£90.3	£10.7	£13.3	£388.4	£9.0	£9.1	£1.0	£7.4	£620
<b>Torfaen</b>	£0.5	£0.2	£22.1	£4.6	£0.9	£4.7	£11.3	£19.4	£60.7	£8.0	£7.8		£8.1	£8.2	£0.9	£6.7	£164
<b>Average per measure</b>	£0.4	£0.2	£24.0	£5.5	£1.2	£5.7	£11.6	£29.4	£59.0	£7.5	£8.3	£111.4	£8.8	£9.0	£1.0	£7.2	£290

**Table A.9 :** Normalised figures of the investment needed per household in each local authority.  
High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :**



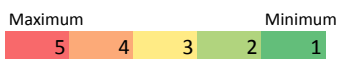
Five colour scale from maximum (red) to minimum (green) values  
Colour coded per column i.e. where is the greatest need for investment per household.

Retrofit 2050

2012	Retrofit 2050																
	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre76 cavity wall insulation	76-83 cavity wall insulation	Post 83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance	
Blaenau Gwent	-£96	-£98		-£56	-£45	-£35	-£28		-£50	-£32	-£4		-£47	-£45	-£111	-£97	
Bridgend	-£96	-£99		-£57	-£46	-£36	-£29		-£51	-£33	-£6		-£47	-£47	-£110	-£97	
Caerphilly	-£96	-£98		-£56	-£46	-£35	-£28		-£50	-£32	-£5		-£47	-£46	-£110	-£97	
Cardiff	-£103	-£105		-£61	-£50	-£40	-£33		-£55	-£37	-£10		-£51	-£52	-£111	-£99	
Merthyr Tydfil	-£96	-£98		-£56	-£45	-£35	-£28		-£50	-£32	-£5		-£47	-£45	-£110	-£97	
Monmouthshire	-£97	-£98		-£58	-£48	-£38	-£32		-£52	-£36	-£11		-£49	-£50	-£105	-£93	
Neath Port Talbot	-£95	-£97		-£56	-£45	-£35	-£29		-£50	-£32	-£6		-£47	-£46	-£109	-£96	
Newport	-£97	-£100		-£58	-£47	-£37	-£30		-£51	-£34	-£8		-£48	-£48	-£111	-£97	
Rhondda, Cynon, Taff	-£96	-£98		-£56	-£46	-£35	-£29		-£50	-£32	-£5		-£47	-£46	-£110	-£97	
Swansea	-£96	-£98		-£57	-£46	-£36	-£29		-£50	-£33	-£7		-£47	-£47	-£110	-£97	
The Vale of Glamorgan	-£99	-£101		-£58	-£47	-£37	-£30		-£52	-£34	-£7		-£49	-£48	-£110	-£97	
Torfaen	-£96	-£98		-£57	-£46	-£36	-£30		-£51	-£34	-£7		-£48	-£47	-£110	-£97	
<b>2017</b>																	
Blaenau Gwent	-£163	-£166	-£37	-£111	-£100	-£89	-£82	-£34	-£104	-£86	-£58	-£16	-£101	-£110	-£227	-£203	
Bridgend	-£164	-£167	-£39	-£112	-£101	-£90	-£83	-£36	-£105	-£87	-£59	-£18	-£102	-£112	-£226	-£203	
Caerphilly	-£163	-£166	-£38	-£111	-£100	-£89	-£82	-£35	-£104	-£86	-£58	-£17	-£101	-£111	-£226	-£203	
Cardiff	-£177	-£179	-£54	-£122	-£111	-£100	-£93	-£47	-£115	-£97	-£70	-£30	-£112	-£125	-£228	-£206	
Merthyr Tydfil	-£163	-£166	-£37	-£111	-£99	-£88	-£82	-£34	-£104	-£86	-£58	-£16	-£101	-£110	-£227	-£203	
Monmouthshire	-£169	-£172	-£49	-£116	-£105	-£95	-£88	-£43	-£110	-£92	-£65	-£25	-£106	-£118	-£219	-£197	
Neath Port Talbot	-£163	-£165	-£38	-£111	-£99	-£89	-£82	-£35	-£104	-£86	-£58	-£17	-£101	-£110	-£225	-£202	
Newport	-£166	-£168	-£41	-£113	-£102	-£91	-£84	-£37	-£106	-£88	-£61	-£19	-£103	-£113	-£227	-£203	
Rhondda, Cynon, Taff	-£163	-£166	-£38	-£111	-£100	-£89	-£82	-£35	-£105	-£86	-£58	-£17	-£101	-£111	-£227	-£203	
Swansea	-£163	-£165	-£39	-£111	-£100	-£89	-£82	-£35	-£104	-£86	-£59	-£17	-£101	-£111	-£225	-£201	
The Vale of Glamorgan	-£167	-£169	-£43	-£114	-£103	-£92	-£85	-£39	-£107	-£89	-£62	-£21	-£104	-£115	-£225	-£202	
Torfaen	-£165	-£167	-£39	-£112	-£101	-£90	-£83	-£36	-£105	-£87	-£59	-£18	-£102	-£112	-£227	-£203	
<b>2022</b>																	
Blaenau Gwent	-£147	-£150	-£16	-£92	-£81	-£70	-£63	-£15	-£85	-£67	-£39		-£82	-£94	-£250	-£212	
Bridgend	-£149	-£151	-£19	-£93	-£82	-£71	-£64	-£17	-£87	-£69	-£40		-£84	-£96	-£250	-£212	
Caerphilly	-£148	-£150	-£17	-£93	-£81	-£70	-£63	-£16	-£86	-£68	-£39		-£83	-£95	-£250	-£212	
Cardiff	-£165	-£168	-£35	-£105	-£94	-£83	-£76	-£28	-£99	-£80	-£52	-£10		-£95	-£113	-£252	-£216
Merthyr Tydfil	-£147	-£149	-£16	-£92	-£81	-£70	-£63	-£15	-£85	-£67	-£39		-£82	-£94	-£250	-£212	
Monmouthshire	-£156	-£159	-£29	-£99	-£88	-£77	-£71	-£24	-£93	-£75	-£47	-£6		-£89	-£105	-£238	-£203
Neath Port Talbot	-£147	-£150	-£18	-£92	-£81	-£70	-£64	-£16	-£86	-£68	-£39		-£83	-£95	-£248	-£210	
Newport	-£151	-£153	-£21	-£95	-£84	-£73	-£66	-£18	-£88	-£70	-£42	£0		-£85	-£98	-£251	-£213
Rhondda, Cynon, Taff	-£148	-£150	-£17	-£93	-£81	-£70	-£64	-£16	-£86	-£68	-£39		-£83	-£95	-£250	-£212	
Swansea	-£148	-£150	-£19	-£93	-£82	-£71	-£64	-£17	-£86	-£68	-£40		-£83	-£95	-£247	-£210	
The Vale of Glamorgan	-£153	-£155	-£23	-£96	-£85	-£74	-£67	-£20	-£90	-£71	-£43	-£1		-£86	-£100	-£248	-£211
Torfaen	-£149	-£152	-£19	-£94	-£83	-£72	-£65	-£17	-£87	-£69	-£40		-£84	-£96	-£250	-£213	

**Table A.10 :** Cost effectiveness of each measure assuming lifetime cost and CO2 savings as calculated at 2012, 2017 and 2022. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

**Legend :**

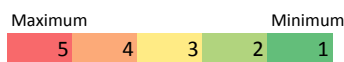


Five colour scale from maximum (red) to minimum (green) values  
Colour coded per row i.e. most cost effective measure per local authority.

	2012															
	Glazing - single to new	Glazing - old double to new	Glazing (to Best Practice)	Loft insulation 0 - 270mm	Loft insulation 25 - 270mm	Loft insulation 50 - 270mm	Loft insulation 75 - 270mm	Loft insulation 100 - 270mm	Pre '76 cavity wall insulation	76-'83 cavity wall insulation	Post '83 cavity wall insulation	Solid wall insulation	DIY floor insulation	Improve airtightness	Insulate primary pipework	Uninsulated cylinder to high performance
Blaenau Gwent	-£96	-£98		-£56	-£45	-£35	-£28		-£50	-£32	-£4		-£47	-£45	-£111	-£97
Bridgend	-£96	-£99		-£57	-£46	-£36	-£29		-£51	-£33	-£6		-£47	-£47	-£110	-£97
Caerphilly	-£96	-£98		-£56	-£46	-£35	-£28		-£50	-£32	-£5		-£47	-£46	-£110	-£97
Cardiff	-£103	-£105		-£61	-£50	-£40	-£33		-£55	-£37	-£10		-£51	-£52	-£111	-£99
Merthyr Tydfil	-£96	-£98		-£56	-£45	-£35	-£28		-£50	-£32	-£5		-£47	-£45	-£110	-£97
Monmouthshire	-£97	-£98		-£58	-£48	-£38	-£32		-£52	-£36	-£11		-£49	-£50	-£105	-£93
Neath Port Talbot	-£95	-£97		-£56	-£45	-£35	-£29		-£50	-£32	-£6		-£47	-£46	-£109	-£96
Newport	-£97	-£100		-£58	-£47	-£37	-£30		-£51	-£34	-£8		-£48	-£48	-£111	-£97
Rhondda, Cynon, Taff	-£96	-£98		-£56	-£46	-£35	-£29		-£50	-£32	-£5		-£47	-£46	-£110	-£97
Swansea	-£96	-£98		-£57	-£46	-£36	-£29		-£50	-£33	-£7		-£47	-£47	-£110	-£97
The Vale of Glamorgan	-£99	-£101		-£58	-£47	-£37	-£30		-£52	-£34	-£7		-£49	-£48	-£110	-£97
Torfaen	-£96	-£98		-£57	-£46	-£36	-£30		-£51	-£34	-£7		-£48	-£47	-£110	-£97
2017																
Blaenau Gwent	-£163	-£166	-£37	-£111	-£100	-£89	-£82	-£34	-£104	-£86	-£58	-£16	-£101	-£110	-£227	-£203
Bridgend	-£164	-£167	-£39	-£112	-£101	-£90	-£83	-£36	-£105	-£87	-£59	-£18	-£102	-£112	-£226	-£203
Caerphilly	-£163	-£166	-£38	-£111	-£100	-£89	-£82	-£35	-£104	-£86	-£58	-£17	-£101	-£111	-£226	-£203
Cardiff	-£177	-£179	-£54	-£122	-£111	-£100	-£93	-£47	-£115	-£97	-£70	-£30	-£112	-£125	-£228	-£206
Merthyr Tydfil	-£163	-£166	-£37	-£111	-£99	-£88	-£82	-£34	-£104	-£86	-£58	-£16	-£101	-£110	-£227	-£203
Monmouthshire	-£169	-£172	-£49	-£116	-£105	-£95	-£88	-£43	-£110	-£92	-£65	-£25	-£106	-£118	-£219	-£197
Neath Port Talbot	-£163	-£165	-£38	-£111	-£99	-£89	-£82	-£35	-£104	-£86	-£58	-£17	-£101	-£110	-£225	-£202
Newport	-£166	-£168	-£41	-£113	-£102	-£91	-£84	-£37	-£106	-£88	-£61	-£19	-£103	-£113	-£227	-£203
Rhondda, Cynon, Taff	-£163	-£166	-£38	-£111	-£100	-£89	-£82	-£35	-£105	-£86	-£58	-£17	-£101	-£111	-£227	-£203
Swansea	-£163	-£165	-£39	-£111	-£100	-£89	-£82	-£35	-£104	-£86	-£59	-£17	-£101	-£111	-£225	-£201
The Vale of Glamorgan	-£167	-£169	-£43	-£114	-£103	-£92	-£85	-£39	-£107	-£89	-£62	-£21	-£104	-£115	-£225	-£202
Torfaen	-£165	-£167	-£39	-£112	-£101	-£90	-£83	-£36	-£105	-£87	-£59	-£18	-£102	-£112	-£227	-£203
2022																
Blaenau Gwent	-£147	-£150	-£16	-£92	-£81	-£70	-£63	-£15	-£85	-£67	-£39		-£82	-£94	-£250	-£212
Bridgend	-£149	-£151	-£19	-£93	-£82	-£71	-£64	-£17	-£87	-£69	-£40		-£84	-£96	-£250	-£212
Caerphilly	-£148	-£150	-£17	-£93	-£81	-£70	-£63	-£16	-£86	-£68	-£39		-£83	-£95	-£250	-£212
Cardiff	-£165	-£168	-£35	-£105	-£94	-£83	-£76	-£28	-£99	-£80	-£52	-£10	-£95	-£113	-£252	-£216
Merthyr Tydfil	-£147	-£149	-£16	-£92	-£81	-£70	-£63	-£15	-£85	-£67	-£39		-£82	-£94	-£250	-£212
Monmouthshire	-£156	-£159	-£29	-£99	-£88	-£77	-£71	-£24	-£93	-£75	-£47	-£6	-£89	-£105	-£238	-£203
Neath Port Talbot	-£147	-£150	-£18	-£92	-£81	-£70	-£64	-£16	-£86	-£68	-£39		-£83	-£95	-£248	-£210
Newport	-£151	-£153	-£21	-£95	-£84	-£73	-£66	-£18	-£88	-£70	-£42	£0	-£85	-£98	-£251	-£213
Rhondda, Cynon, Taff	-£148	-£150	-£17	-£93	-£81	-£70	-£64	-£16	-£86	-£68	-£39		-£83	-£95	-£250	-£212
Swansea	-£148	-£150	-£19	-£93	-£82	-£71	-£64	-£17	-£86	-£68	-£40		-£83	-£95	-£247	-£210
The Vale of Glamorgan	-£153	-£155	-£23	-£96	-£85	-£74	-£67	-£20	-£90	-£71	-£43	-£1	-£86	-£100	-£248	-£211
Torfaen	-£149	-£152	-£19	-£94	-£83	-£72	-£65	-£17	-£87	-£69	-£40		-£84	-£96	-£250	-£213

Table A.11 : Cost effectiveness of each measure assuming lifetime cost and CO2 savings as calculated at 2012, 2017 and 2022. High fuel cost scenario, EMR grid decarbonisation profile, 7% interest rate, taxation included.

Legend :



Five colour scale from maximum (red) to minimum (green) values  
Colour coded per column i.e. local authority where the measure is most cost effective.